



2nd Attempt

Subject: Chemistry

Time: 3.30 hours

fingerprint

A

Answer the following questions: (two marks for each correct choice)

- A molecule forms ion by the action of solvent:-
 A. KF B. F₂ C. HF D. CH₃OH
 - When 0.3 moles of potassium nitrate (KNO₃) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. [H₃O⁺]=[OH⁻]
 C. 0.6 moles of ions is formed D. all of them are correct
 - Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO₃ B. CaCl₂ C. KCl D. NH₄NO₃
 - The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
 - Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
 A. acetic acid B. phenol
 C. ether D. camphor
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|-----------------------|--------|-------|-------------|---------|
| K _f (°C/m) | -7.40 | -1.79 | -3.9 | -39.7 |
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO₄ B. Mg₃(PO₄)₂ C. Mg₃PO₄ D. KCl
 - Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH₃ D. HF
 - In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH₃ B. OH⁻ C. H₃O⁺ D. None of them
 - One of the following is not Bronsted-Lowry acid:-
 A. BF₃ B. HCN C. H₂SO₄ D. NH₄⁺
 - In which of the following an aqueous solution acids the [acid]>[H₃O⁺]?
 A. HNO₃ B. CH₃COOH C. H₂SO₄ D. All of them
 - Which of the following statements is **not** suitable for this reaction:
 HF(aq)+ HPO₄²⁻ (aq) → F⁻ (aq)+H₂PO₄⁻(aq)?
 A. HF is the acid B. HPO₄²⁻ is the base C. F⁻ is the conjugate base D. H₂PO₄⁻ is the conjugate base
 - In this reaction: Mg(s)+H₂SO₄(aq) → , which of the following is spectator ion?
 A. Mg²⁺ B. SO₄²⁻ C. H₃O⁺ D. both (A and B)
 - Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH₃ B. NaHCO₃ C. NaOH D. both (A and C)

14. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base

15. The [OH⁻] of pure water at specified temperature is equal to 2.3x10⁻⁷M, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0x10⁻¹⁴ B. 3.0x10⁻¹⁵ C. 5.3x10⁻¹⁴ D. 2.3x10⁻⁷

16. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H₂SO₄ solution :-

- A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined

17. How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol)

- A. 3.42 B. 1.71 C. 17.1 D. 34.2

18. In the 0.5M H₂SO₄ solution:- (suppose it ionized completely)

- A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)

19. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

20. Which of the following reaction is always spontaneous?

- A. C₂H₄(g)+ H₂(g) → C₂H₆(g)+ energy B. NH₄Cl(s) → NH₃(g)+ HCl(g) ΔH>0
 C. 1/2N₂(g)+ O₂(g) +33.2kJ → NO₂(g) D. none of them

21. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K)

- A. 570 B. 470 C. 277 D. 550

22. In this reaction: 2C_(graphite) + 2O₂(g) → 2CO₂(g)+787kJ ,which of the following is correct?

- A. ΔH_c⁰ of graphite = -393.5 kJ/mol B. ΔH⁰ = ΔH_f⁰ of CO₂
 C. ΔH⁰ = ΔH_c⁰ of graphite D. All of them are correct

23. In a reaction, ΔG⁰= - 4.7 kJ/mol and ΔH⁰= -57.2 kJ/mol, then the value of ΔS⁰ at room temperature is equal to:-

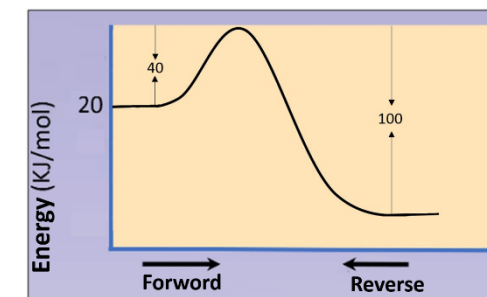
- A. - 0.176J/(mol.K) B. - 0.176kJ/(mol.K) C. + 0.176kJ/(mol.K) D. - 2.1kJ/(mol.K)

24. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

25. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



26. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change
 B. reverse activation energy
 C. energy level of reactant
 D. both (A and C)
27. In this hypothetical reaction: $A + B \rightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2
 B. 8
 C. 4
 D. 9
28. The value of specific rate constant of reaction increases by:-
 A. using catalyst
 B. increasing reactant concentration
 C. increasing temperature
 D. both (A and C) are correct
29. The rate of this reaction: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-
 A. increasing pressure
 B. increasing HCl concentration
 C. increasing surface area of Zn
 D. both (B and C)
30. This reaction: $2NO + 2H_2 \rightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is:
 $2NO + H_2 \rightarrow N_2 + H_2O_2$, which of the following is the reaction of step two?
 A. $NO + H_2O_2 \rightarrow NO_3 + H_2$
 B. $H_2 + H_2O_2 \rightarrow 2H_2O$
 C. $NO + H_2O \rightarrow H_2 + NO_2$
 D. None of them
31. In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
32. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$
 B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$
 D. increasing ionization of acid and decreasing $[H_3O^+]$
33. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$
 B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$
 D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
34. This reaction: $Ba(OH)_2(aq) + H_2SO_4(aq) \rightarrow$, goes to completion because:
 A. formation of a gas
 B. formation of a slightly ionized product
 C. formation of precipitate
 D. Both (B and C)
35. An equilibrium mixture at $25^\circ C$ is found to consist of $6.4 \times 10^{-3} M$ PCl_3 , $2.5 \times 10^{-2} M$ Cl_2 and $4.0 \times 10^{-3} M$ PCl_5 , then equilibrium constant for this reaction: $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, is equal to:
 A. 25
 B. 0.04
 C. 0.4
 D. 2.5
36. In the following equilibrium hypothetical gaseous reaction: $A + 3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant(K) at $300^\circ C$ is 0.5, the value of (K) at $200^\circ C$ for this reaction: $2C + \text{energy} \rightleftharpoons A + 3B$, is:-
 A. less than 2
 B. greater than 2
 C. equal 2
 D. cannot be determined

37. An ion that doesn't hydrolyze:-
 A. NO_2^-
 B. CH_3COO^-
 C. ClO_4^-
 D. NH_4^+
38. The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4}
 B. 5.1×10^{-4}
 C. 1.6×10^{-5}
 D. 4.1×10^{-6}
39. Butane and 2-methyl propane are similar in all of the following EXCEPT:-
 A. molecular formula
 B. general formula
 C. molar mass
 D. boiling point
40. Which of the following may be saturated hydrocarbon?
 A. C_3H_6
 B. C_5H_8
 C. C_7H_8
 D. none of them
41. The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2 + H_2O$
 B. $CO_2 + 2H_2O$
 C. $2CO_2 + 2H_2O$
 D. $4CO_2 + 5H_2O$
42. The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ CH_2 = C - CH = CH - CH_3 \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene
 B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene
 D. 2-methyl-1,3-pentene
43. Which of the following organic compounds pairs is not a structural isomer to each other?
 A. pentane and 2,2-di methyl propane
 B. hexene and cyclohexane
 C. pentane and cyclopentane
 D. pentane and 2-methyl butane
44. Which of the following hydrocarbons is at liquid state?
 A. methane
 B. propane
 C. 2-methylbutane
 D. none of them
45. The compound Freon-11 is called:-
 A. trichlorofluoromethane
 B. dichlorodifluoromethane
 C. chlorotrifluoromethane
 D. 3-chloro-1-fluoromethane
46. The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2
 B. CFCs
 C. C_2F_4
 D. MTBE
47. The simplest ester is:-
 A. $HCOOH$
 B. $HCOOCH_3$
 C. CH_3COOH
 D. CH_3COOCH_3
48. This reaction: (ethanoic acid + methanol $\rightarrow$ methyl ethanoate + water), is called:-
 A. condensation
 B. addition
 C. substitution
 D. elimination
49. Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone
 B. carboxylic acid and ester
 C. amines
 D. All of them
50. Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+)
 B. $(R-NH_2)$
 C. $(R-NH-R')$
 D. None of them



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B

Answer the following questions: (two marks for each correct choice)

- The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?
 A. $\text{C(s)} + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO(s)} + \text{CO}_2(\text{g})$
 C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
- Which of the following is a general formula for secondary amine?
 A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them
- Which of the following statements is **not suitable** for this reaction:
 $\text{HF(aq)} + \text{HPO}_4^{2-}(\text{aq}) \rightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
- In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?
 A. $\Delta H^\circ_{\text{C}}$ of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_{\text{f}}$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_{\text{C}}$ of graphite D. All of them are correct

13. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl(s)} \rightarrow \text{NH}_3(\text{g}) + \text{HCl(g)} \quad \Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \rightarrow \text{NO}_2(\text{g})$ D. none of them

14. In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

15. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
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16. This reaction: (ethanoic acid + methanol $\rightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

17. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)

18. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)

19. This reaction: $\text{Ba(OH)}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)

20. Adding a small amount of KCN to HCN solution leads to:-

- A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
 C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

21. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

22. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

23. The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$

- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

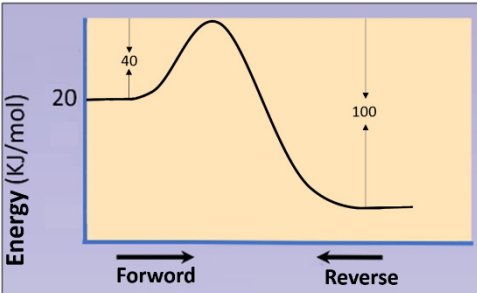
24. The product of complete combustion of one mole of simplest alkyne is:-

- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

25. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

- 26.** The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:
A. 1.0×10^{-14} **B.** 3.0×10^{-15} **C.** 5.3×10^{-14} **D.** 2.3×10^{-7}
- 27.** How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass= 171g/mol)
A. 3.42 **B.** 1.71 **C.** 17.1 **D.** 34.2
- 28.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|---------------------------|--------|-------|-------------|---------|
| $K_f(^{\circ}\text{C/m})$ | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 29.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
A. NaNO_3 **B.** CaCl_2 **C.** KCl **D.** NH_4NO_3
- 30.** The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-
A. increasing pressure **B.** increasing HCl concentration
C. increasing surface area of Zn **D.** both (B and C)
- 31.** Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
A. HCl **B.** KOH **C.** NH_3 **D.** HF
- 32.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= 0.449J/(g.K))
A. 570 **B.** 470 **C.** 277 **D.** 550
- 33.** In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow$, which of the following is spectator ion?
A. Mg^{2+} **B.** SO_4^{2-} **C.** H_3O^+ **D.** both (A and B)
- 34.** The value of specific rate constant of reaction increases by:-
A. using catalyst **B.** increasing reactant concentration
C. increasing temperature **D.** both (A and C) are correct
- 35.** Which of the following organic compounds that are often responsible for odors and flavors?
A. aldehyde and ketone **B.** carboxylic acid and ester **C.** amines **D.** All of them
- 36.** Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them
- 37.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. pH= 0.3 **B.** pH= 0 **C.** pOH= 14 **D.** both (B and C)
- 38.** The simplest ester is:-
A. HCOOH **B.** HCOOCH_3 **C.** CH_3COOH **D.** $\text{CH}_3\text{COOCH}_3$
- 39.** In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
A. -0.176 J/(mol.K) **B.** $-0.176 \text{ kJ/(mol.K)}$ **C.** $+0.176 \text{ kJ/(mol.K)}$ **D.** -2.1 kJ/(mol.K)
- 40.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base

- 41.** In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5 , the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
A. less than 2 **B.** greater than 2 **C.** equal 2 **D.** cannot be determined
- 42.** An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$, is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 43.** One of the following is not Bronsted-Lowry acid:-
A. BF_3 **B.** HCN **C.** H_2SO_4 **D.** NH_4^+
- 44.** In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH_3 **B.** OH^- **C.** H_3O^+ **D.** None of them
- 45.** In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol , then the energy of product equal to:-
- 
- A.** -60 kJ/mol **B.** -40 kJ/mol **C.** 80 kJ/mol **D.** -120 kJ/mol
- 46.** Which of the following organic compounds pairs is **not** a structural isomer to each other?
A. pentane and 2,2-di methyl propane **B.** hexene and cyclohexane
C. pentane and cyclopentane **D.** pentane and 2-methyl butane
- 47.** Which of the following may be saturated hydrocarbon?
A. C_3H_6 **B.** C_5H_8 **C.** C_7H_8 **D.** none of them
- 48.** In this hypothetical reaction: $\text{A} + \text{B} \rightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A.** 2 **B.** 8
C. 4 **D.** 9
- 49.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
A. MgPO_4 **B.** $\text{Mg}_3(\text{PO}_4)_2$ **C.** Mg_3PO_4 **D.** KCl
- 50.** Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
A. molecular formula **B.** general formula **C.** molar mass **D.** boiling point



2nd Attempt

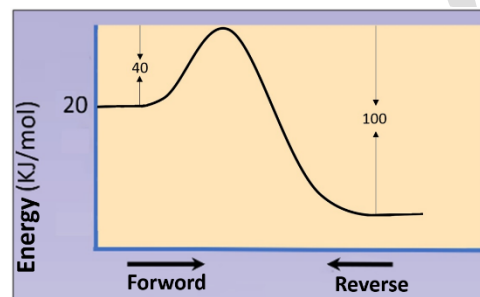
Subject: Chemistry
 Time: 3.30 hours

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C

Answer the following questions: (two marks for each correct choice)

- If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change
 B. reverse activation energy
 C. energy level of reactant
 D. both (A and C)
- Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3
 B. NaHCO_3
 C. NaOH
 D. both (A and C)
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric
 B. has little tendency to attract a proton
 C. is Bronsted-Lowry base
 D. is Arrhenius base
- Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane
 B. hexene and cyclohexane
 C. pentane and cyclopentane
 D. pentane and 2-methyl butane
- The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-
 A. increasing pressure
 B. increasing HCl concentration
 C. increasing surface area of Zn
 D. both (B and C)
- In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-
 A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. - 0.176J/(mol.K)
 B. - 0.176kJ/(mol.K)
 C. + 0.176kJ/(mol.K)
 D. - 2.1kJ/(mol.K)
- Which of the following is a general formula for secondary amine?
 A. $(\text{R}_2\text{N}-\text{H}^+)$
 B. $(\text{R}-\text{NH}_2)$
 C. $(\text{R}-\text{NH}-\text{R}')$
 D. None of them
- An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{ M PCl}_3$, $2.5 \times 10^{-2} \text{ M Cl}_2$ and $4.0 \times 10^{-3} \text{ M PCl}_5$, then equilibrium constant for this reaction: $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$, is equal to:
 A. 25
 B. 0.04
 C. 0.4
 D. 2.5
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3
 B. CaCl_2
 C. KCl
 D. NH_4NO_3

- Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
 A. acetic acid
 B. phenol
 C. ether
 D. camphor
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|---------------------------|--------|-------|-------------|---------|
| $K_f(^{\circ}\text{C}/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= $0.449\text{J}/(\text{g.K})$)
 A. 570
 B. 470
 C. 277
 D. 550
 - A molecule forms ion by the action of solvent:-
 A. KF
 B. F_2
 C. HF
 D. CH_3OH
 - In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
 - In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2\text{(g)} \rightarrow 2\text{CO}_2\text{(g)} + 787\text{kJ}$, which of the following is correct?
 A. ΔH^0_c of graphite = -393.5 kJ/mol
 B. $\Delta H^0 = \Delta H^0_f$ of CO_2
 C. $\Delta H^0 = \Delta H^0_c$ of graphite
 D. All of them are correct
 - The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$
 A. 4-methyl-2,4-butadiene
 B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene
 D. 2-methyl-1,3-pentene
 - Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl
 B. KOH
 C. NH_3
 D. HF
 - In this hypothetical reaction: $\text{A} + \text{B} \rightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
 A. 2
 B. 8
 C. 4
 D. 9
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4
 B. $\text{Mg}_3(\text{PO}_4)_2$
 C. Mg_3PO_4
 D. KCl
 - Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature.
 D. All of them
 - The value of specific rate constant of reaction increases by:-
 A. using catalyst
 B. increasing reactant concentration
 C. increasing temperature
 D. both (A and C) are correct

22. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?

- A. the entropy of the system increases
B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed
D. all of them are correct

23. One of the following is not Bronsted-Lowry acid:-

- A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

24. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

25. The simplest ester is:-

- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

26. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-

- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}

27. Adding a small amount of KCN to HCN solution leads to:-

- A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

28. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
C. formation of precipitate D. Both (B and C)

29. The compound Freon-11 is called:-

- A. trichlorofluoromethane B. dichlorodifluoromethane
C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

30. In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?

- A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

31. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)

- A. $\text{pH} = 0.3$ B. $\text{pH} = 0$ C. $\text{pOH} = 14$ D. both (B and C)

32. How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13?

- (molar mass = 171 g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2

33. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

34. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
C. nature of solvent D. concentration of solute particles

35. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

36. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

37. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{ M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

38. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

39. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

40. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

41. In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)

42. Which of the following may be saturated hydrocarbon?

- A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them

43. The product of complete combustion of one mole of simplest alkyne is:-

- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

44. This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:

$2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?

- A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them

45. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

46. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them

47. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

48. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

49. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-

- A. is equal to the acid solution volume B. is equal to half the acid solution volume
C. is equal to double the acid solution volume D. cannot be determined

50. Which of the following statements is **not suitable** for this reaction:

$\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$?

- A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base



2nd Attempt

Time: 3.30 hours

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D

Answer the following questions: (two marks for each correct choice)

- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. $MgPO_4$ B. $Mg_3(PO_4)_2$ C. Mg_3PO_4 D. KCl
- Which of the following reaction is always spontaneous?
 A. $C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g) + \text{energy}$ B. $NH_4Cl(s) \longrightarrow NH_3(g) + HCl(g)$ $\Delta H > 0$
 C. $1/2 N_2(g) + O_2(g) + 33.2 kJ \longrightarrow NO_2(g)$ D. none of them
- An equilibrium mixture at $25^\circ C$ is found to consist of $6.4 \times 10^{-3} M$ PCl_3 , $2.5 \times 10^{-2} M$ Cl_2 and $4.0 \times 10^{-3} M$ PCl_5 , then equilibrium constant for this reaction: $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, is equal to:
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 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
- This reaction: $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is:
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 A. $NO + H_2O_2 \longrightarrow NO_3 + H_2$ B. $H_2 + H_2O_2 \longrightarrow 2H_2O$
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- In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
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- Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
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- The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
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- In this reaction: $2C_{(graphite)} + 2O_2(g) \longrightarrow 2CO_2(g) + 787 kJ$, which of the following is correct?
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- In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

- A. 2 B. 8
 C. 4 D. 9

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- Which of the following organic compounds that are often responsible for odors and flavors?
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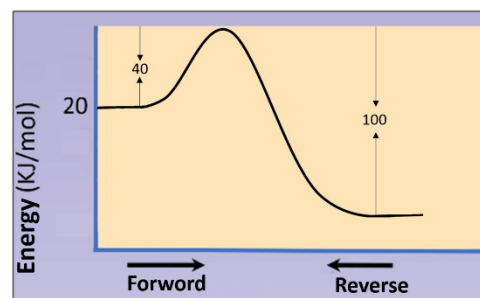
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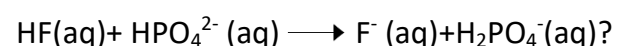
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- A. using catalyst B. increasing reactant concentration
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- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

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- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

40. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid B. phenol
C. ether D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

41. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

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C. energy level of reactant D. both (A and C)

42. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

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- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

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C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

45. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

46. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-

- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}

47. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

48. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

49. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-

- A. is equal to the acid solution volume B. is equal to half the acid solution volume
C. is equal to double the acid solution volume D. cannot be determined

50. In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?

- A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$



Answer the following questions: (two marks for each correct choice)

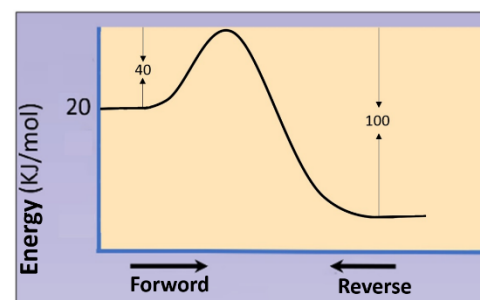
1. How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2

2. One of the following is not Bronsted-Lowry acid:-

- A. BF₃ B. HCN C. H₂SO₄ D. NH₄⁺

3. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



4. The product of complete combustion of one mole of simplest alkyne is:-

- A. 2CO₂+H₂O B. CO₂+2H₂O C. 2CO₂+2H₂O D. 4CO₂+5H₂O

5. This reaction: 2NO+2H₂ → N₂+2H₂O , is occur in two steps, the reaction for step one is:

2NO+ H₂ → N₂+ H₂O₂, which of the following is the reaction of step two?

- A. NO+ H₂O₂ → NO₃+ H₂ B. H₂+ H₂O₂ → 2H₂O
 C. NO+ H₂O → H₂+ NO₂ D. None of them

6. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

7. In a reaction, ΔG⁰= - 4.7 kJ/mol and ΔH⁰= -57.2 kJ/mol, then the value of ΔS⁰ at room temperature is equal to:-

- A. - 0.176J/(mol.K) B. - 0.176kJ/(mol.K) C. + 0.176kJ/(mol.K) D. - 2.1kJ/(mol.K)

8. The [OH⁻] of pure water at specified temperature is equal to 2.3x10⁻⁷M, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0x10⁻¹⁴ B. 3.0x10⁻¹⁵ C. 5.3x10⁻¹⁴ D. 2.3x10⁻⁷

9. An equilibrium mixture at 25°C is found to consist of 6.4x10⁻³M PCl₃, 2.5x10⁻²M Cl₂ and 4.0x10⁻³M PCl₅ , then equilibrium constant for this reaction: PCl₅(g) ⇌ PCl₃(g) + Cl₂(g), is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

10. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

11. In this reaction: 2C_(graphite) + 2O₂(g) → 2CO₂(g)+787kJ ,which of the following is correct?

- A. ΔH⁰_c of graphite = -393.5 kJ/mol B. ΔH⁰ = ΔH⁰_f of CO₂
 C. ΔH⁰ = ΔH⁰_c of graphite D. All of them are correct

12. A molecule forms ion by the action of solvent:-

- A. KF B. F₂ C. HF D. CH₃OH

13. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane

14. When 0.3 moles of potassium nitrate (KNO₃) dissolves in water, which of the following is correct?

- A. the entropy of the system increases B. [H₃O⁺]=[OH⁻]
 C. 0.6 moles of ions is formed D. all of them are correct

15. In this reaction: Mg(s)+H₂SO₄(aq) → , which of the following is spectator ion?

- A. Mg²⁺ B. SO₄²⁻ C. H₃O⁺ D. both (A and B)

16. Which of the following statements is **not** suitable for this reaction:

HF(aq)+ HPO₄²⁻ (aq) → F⁻ (aq)+H₂PO₄⁻(aq)?

- A. HF is the acid B. HPO₄²⁻ is the base C. F⁻ is the conjugate base D. H₂PO₄⁻ is the conjugate base

17. Which of the following may be saturated hydrocarbon?

- A. C₃H₆ B. C₅H₈ C. C₇H₈ D. none of them

18. The compound Freon-11 is called:-

- A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

19. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

20. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?

- A. HCl B. KOH C. NH₃ D. HF

21. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

22. In the following reaction: H₂O(g)+CO(g) ⇌ H₂(g)+CO₂(g) , over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

23. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. C(s)+ O₂(g) ⇌ CO₂(g) B. CaCO₃(s) ⇌ CaO(s) +CO₂(g)
 C. 2H₂(g) + O₂(g) ⇌ 2H₂O (g) D. N₂(g)+3H₂(g) ⇌ 2NH₃(g)

24. In which of the following an aqueous solution acids the [acid]>[H₃O⁺]?

- A. HNO₃ B. CH₃COOH C. H₂SO₄ D. All of them

25. In the following equilibrium hypothetical gaseous reaction: A+3B ⇌ 2C +energy, the value of equilibrium constant(K) at 300°C is 0.5 , the value of (K) at 200°C for this reaction: 2C+ energy ⇌ A+3B ,is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

- 26.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 27.** Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and $[H_3O^+]$ **B.** decreasing ionization of acid and increasing $[H_3O^+]$
C. increasing both ionization of acid and $[H_3O^+]$ **D.** increasing ionization of acid and decreasing $[H_3O^+]$
- 28.** An ion that doesn't hydrolyze:-
A. NO_2^- **B.** CH_3COO^- **C.** ClO_4^- **D.** NH_4^+
- 29.** The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
A. 4-methyl-2,4-butadiene **B.** 4-methyl-2,4-pentadiene
C. 2-methyl-1,3-pentadiene **D.** 2-methyl-1,3-pentene
- 30.** The value of specific rate constant of reaction increases by:-
A. using catalyst **B.** increasing reactant concentration
C. increasing temperature **D.** both (A and C) are correct
- 31.** The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to 1.6×10^{-2} mol/L, then the value of K_{sp} is:-
A. 2.5×10^{-4} **B.** 5.1×10^{-4} **C.** 1.6×10^{-5} **D.** 4.1×10^{-6}
- 32.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate? **A.** $MgPO_4$ **B.** $Mg_3(PO_4)_2$ **C.** Mg_3PO_4 **D.** KCl
- 33.** If 3.5kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron = $0.449 J/(g.K)$)
A. 570 **B.** 470 **C.** 277 **D.** 550
- 34.** This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
A. condensation **B.** addition **C.** substitution **D.** elimination
- 35.** This reaction: $Ba(OH)_2(aq) + H_2SO_4(aq) \longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)
- 36.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. pH = 0.3 **B.** pH = 0 **C.** pOH = 14 **D.** both (B and C)
- 37.** The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
A. is equal to the acid solution volume **B.** is equal to half the acid solution volume
C. is equal to double the acid solution volume **D.** cannot be determined
- 38.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base
- 39.** In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH_3 **B.** OH^- **C.** H_3O^+ **D.** None of them

- 40.** The simplest ester is:-
A. $HCOOH$ **B.** $HCOOCH_3$ **C.** CH_3COOH **D.** CH_3COOCH_3
- 41.** Which of the following is a general formula for secondary amine?
A. (R_2N-H^+) **B.** $(R-NH_2)$ **C.** $(R-NH-R')$ **D.** None of them
- 42.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at $7.8^\circ C$ below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|--------------------|--------|-------|-------------|---------|
| $K_f(^{\circ}C/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 43.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH_3 **B.** $NaHCO_3$ **C.** NaOH **D.** both (A and C)
- 44.** The rate of this reaction: $Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-
A. increasing pressure **B.** increasing HCl concentration
C. increasing surface area of Zn **D.** both (B and C)
- 45.** Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them
- 46.** The Teflon is a sample of addition polymer, its monomer is:-
A. C_2F_2 **B.** CFCs **C.** C_2F_4 **D.** MTBE
- 47.** Which of the following reaction is always spontaneous?
A. $C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g) + \text{energy}$ **B.** $NH_4Cl(s) \longrightarrow NH_3(g) + HCl(g)$ $\Delta H > 0$
C. $1/2 N_2(g) + O_2(g) + 33.2 kJ \longrightarrow NO_2(g)$ **D.** none of them
- 48.** In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A.** 2 **B.** 8
C. 4 **D.** 9
- 49.** The boiling-point elevation is colligative property it depends on the:-
A. nature of solute **B.** concentration of solvent particles
C. nature of solvent **D.** concentration of solute particles
- 50.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
A. $NaNO_3$ **B.** $CaCl_2$ **C.** KCl **D.** NH_4NO_3



2nd Attempt

Time: 3.30 hours

fingerprint

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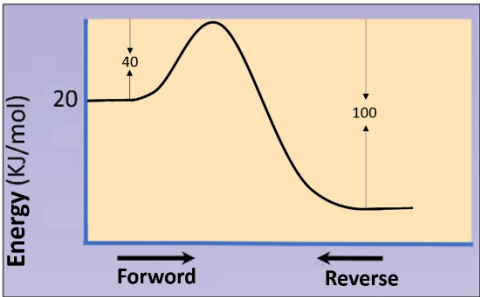
Answer the following questions: (two marks for each correct choice)

- The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
- The simplest ester is:-
 A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$
- The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- Which of the following organic compounds that are often responsible for odors and flavors?
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- This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
- Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
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 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
- Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C/m})$	-7.40	-1.79	-3.9	-39.7

 A. acetic acid B. phenol
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 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)
- Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
- A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
- Which of the following hydrocarbons is at liquid state?
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- 28.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
- A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
- 29.** In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol, then the energy of product equal to:-
- A. - 60 kJ/mol
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- 30.** If 3.5 kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron = 0.449 J/(g.K))
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- 32.** In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
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- A. nature of solute B. concentration of solvent particles
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- | Experiment | [A] | [B] | Rate (M/s) |
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- 40.** In this reaction: $Mg(s) + H_2SO_4(aq) \rightarrow$, which of the following is spectator ion?
- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- 41.** How many grams of $Ba(OH)_2$ must be dissolved in 200 mL of water to make a solution with pH 13? (molar mass = 171 g/mol)
- A. 3.42 B. 1.71 C. 17.1 D. 34.2
- 42.** The $[OH^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} M$, then the value of ionization constant of water at the same temperature is equal to:
- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- 43.** In this reaction: $2C_{(graphite)} + 2O_2(g) \rightarrow 2CO_2(g) + 787 kJ$, which of the following is correct?
- A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
 C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct
- 44.** The product of complete combustion of one mole of simplest alkyne is:-
- A. $2CO_2 + H_2O$ B. $CO_2 + 2H_2O$ C. $2CO_2 + 2H_2O$ D. $4CO_2 + 5H_2O$
- 45.** The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- 46.** The Teflon is a sample of addition polymer, its monomer is:-
- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- 47.** An ion that doesn't hydrolyze:-
- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
- 48.** In the reaction ammonium ions with water molecule which of the following is not produced?
- A. NH_3 B. OH^- C. H_3O^+ D. None of them
- 49.** In the 0.5 M H_2SO_4 solution:- (suppose it ionized completely)
- A. pH = 0.3 B. pH = 0 C. pOH = 14 D. both (B and C)
- 50.** Which of the following is correct?
- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them



2nd Attempt

Time: 3.30 hours

fingerprint

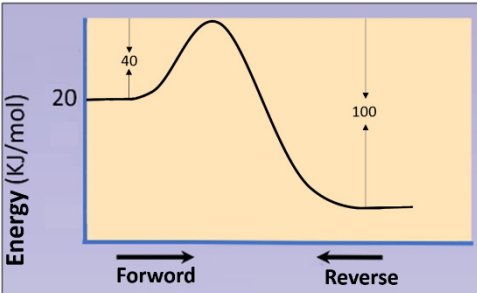
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Answer the following questions: (two marks for each correct choice)

- In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4\text{(aq)} \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
 - Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
 - The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
 - This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
 - A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
 - Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
 - One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
 - The simplest ester is:-
 A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$
 - When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
 - Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
 A. acetic acid B. phenol
 C. ether D. camphor
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|---------------------------|--------|-------|-------------|---------|
| $K_f(^{\circ}\text{C/m})$ | -7.40 | -1.79 | -3.9 | -39.7 |
- If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= $0.449\text{J}/(\text{g.K})$)
 A. 570 B. 470 C. 277 D. 550
 - The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
 - The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base

- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- The correct name for this compound: $\begin{matrix} \text{CH}_3 \\ | \\ (\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3) \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
- The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
- This reaction: $\text{Ba(OH)}_2\text{(aq)} + \text{H}_2\text{SO}_4\text{(aq)} \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point

28. Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
29. The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2+H_2O$ B. CO_2+2H_2O C. $2CO_2+2H_2O$ D. $4CO_2+5H_2O$
30. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
31. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)
32. How many grams of $Ba(OH)_2$ must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2
33. In this reaction: $2C_{(graphite)} + 2O_2(g) \longrightarrow 2CO_2(g)+787kJ$, which of the following is correct?
 A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
 C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct
34. Which of the following statements is **not** suitable for this reaction:
 $HF(aq)+ HPO_4^{2-}(aq) \longrightarrow F^-(aq)+H_2PO_4^-(aq)$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. $H_2PO_4^-$ is the conjugate base
35. The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
36. In this hypothetical reaction: $A+B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
 C. 4 D. 9
37. An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
38. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. $C(s)+ O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g)$
39. Which of the following reaction is always spontaneous?
 A. $C_2H_4(g)+ H_2(g) \longrightarrow C_2H_6(g)+ \text{energy}$ B. $NH_4Cl(s) \longrightarrow NH_3(g)+ HCl(g)$ $\Delta H > 0$
 C. $1/2N_2(g)+ O_2(g) + 33.2kJ \longrightarrow NO_2(g)$ D. none of them
40. Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. $NaHCO_3$ C. $NaOH$ D. both (A and C)

41. In the following reaction: $H_2O(g)+CO(g) \rightleftharpoons H_2(g)+CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
42. Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
43. In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. $-0.176J/(mol.K)$ B. $-0.176kJ/(mol.K)$ C. $+0.176kJ/(mol.K)$ D. $-2.1kJ/(mol.K)$
44. The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
45. Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
46. An equilibrium mixture at $25^\circ C$ is found to consist of $6.4 \times 10^{-3} M$ PCl_3 , $2.5 \times 10^{-2} M$ Cl_2 and $4.0 \times 10^{-3} M$ PCl_5 , then equilibrium constant for this reaction: $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
47. In the following equilibrium hypothetical gaseous reaction: $A+3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant(K) at $300^\circ C$ is 0.5, the value of (K) at $200^\circ C$ for this reaction: $2C + \text{energy} \rightleftharpoons A+3B$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
48. The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
49. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-
- 
- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol
50. The $[OH^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} M$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}



2nd Attempt

Time: 3.30 hours

fingerprint

H

Answer the following questions: (two marks for each correct choice)

1. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K)

- A. 570 B. 470 C. 277 D. 550

2. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane

3. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

4. In this hypothetical reaction: $\text{A} + \text{B} \rightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

- A. 2 B. 8
 C. 4 D. 9

5. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles

6. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)

7. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

8. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

- A. acetic acid B. phenol
 C. ether D. camphor

9. In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)

10. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)

11. One of the following is not Bronsted-Lowry acid:-

- A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

12. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)

- A. $\text{pH} = 0.3$ B. $\text{pH} = 0$ C. $\text{pOH} = 14$ D. both (B and C)

13. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

14. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

15. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \rightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \quad \Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \rightarrow \text{NO}_2(\text{g})$ D. none of them

16. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

17. This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:

$2\text{NO} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?

- A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them

18. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

19. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

20. This reaction: (ethanoic acid + methanol $\rightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

21. How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol)

- A. 3.42 B. 1.71 C. 17.1 D. 34.2

22. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

23. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

24. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$, goes to completion because:

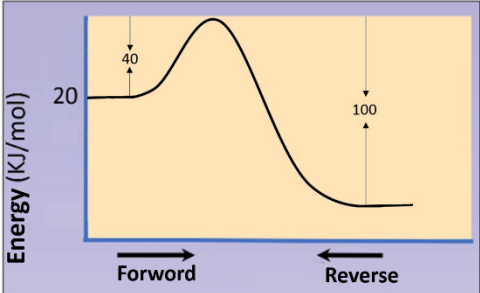
- A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)

25. The value of specific rate constant of reaction increases by:-

- A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct

26. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?

- A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl

27. The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
28. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
29. The product of complete combustion of one mole of simplest alkyne is:-
 A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$
30. The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
31. In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol, then the energy of product equal to:-
 A. - 60 kJ/mol B. - 40 kJ/mol
 C. 80 kJ/mol D. - 120 kJ/mol
- 
32. An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
33. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
34. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
35. Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
36. The simplest ester is:-
 A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$
37. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
38. Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
39. In a reaction, $\Delta G^\circ = -4.7 \text{ kJ/mol}$ and $\Delta H^\circ = -57.2 \text{ kJ/mol}$, then the value of ΔS° at room temperature is equal to:-
 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
40. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
 C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

41. The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
42. The rate of this reaction: $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
43. The correct name for this compound: CH_3
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
44. In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
45. Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
46. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
47. Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
48. The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
49. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?
 A. $\Delta H^\circ_{\text{C}}$ of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_{\text{f}}$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_{\text{C}}$ of graphite D. All of them are correct
50. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}



Answer the following questions: (two marks for each correct choice)

- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
- Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)
- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?
 A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

12. The simplest ester is:-

- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

13. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}')$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

14. In a reaction, $\Delta G^\circ = -4.7 \text{ kJ/mol}$ and $\Delta H^\circ = -57.2 \text{ kJ/mol}$, then the value of ΔS° at room temperature is equal to:-

- A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)

15. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

16. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

17. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

18. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

19. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron = 0.449 J/(g.K))

- A. 570 B. 470 C. 277 D. 550

20. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

21. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

22. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid B. phenol
 C. ether D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f (^\circ\text{C/m})$	-7.40	-1.79	-3.9	-39.7

23. The rate of this reaction: $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

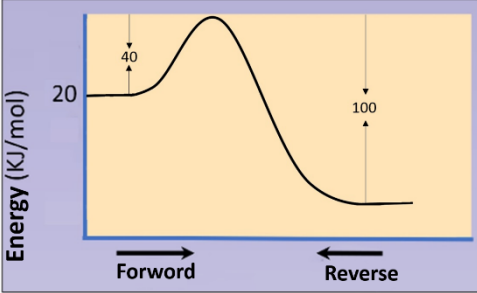
24. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10 kJ/mol , which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)

25. This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is: $2\text{NO} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?

- A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them

- 26.** Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- 27.** The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- 28.** Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
- 29.** In this reaction: $2C_{(\text{graphite})} + 2O_2(g) \longrightarrow 2CO_2(g) + 787 \text{ kJ}$, which of the following is correct?
 A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
 C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct
- 30.** Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- 31.** The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- 32.** The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- 33.** Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
- 34.** The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- 35.** When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[H_3O^+] = [OH^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- 36.** Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
- 37.** Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
- 38.** In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
 C. 4 D. 9
- 39.** An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

- 40.** The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2 + H_2O$ B. $CO_2 + 2H_2O$ C. $2CO_2 + 2H_2O$ D. $4CO_2 + 5H_2O$
- 41.** In this reaction: $Mg(s) + H_2SO_4(aq) \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- 42.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)
- 43.** How many grams of $Ba(OH)_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass= 171 g/mol)
 A. 3.42 B. 1.71 C. 17.1 D. 34.2
- 44.** Which of the following statements is **not** suitable for this reaction:
 $HF(aq) + HPO_4^{2-}(aq) \longrightarrow F^-(aq) + H_2PO_4^-(aq)$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. $H_2PO_4^-$ is the conjugate base
- 45.** Which of the following reaction is always spontaneous?
 A. $C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g) + \text{energy}$ B. $NH_4Cl(s) \longrightarrow NH_3(g) + HCl(g)$ $\Delta H > 0$
 C. $1/2 N_2(g) + O_2(g) + 33.2 \text{ kJ} \longrightarrow NO_2(g)$ D. none of them
- 46.** In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol , then the energy of product equal to:-
- 
- A. -60 kJ/mol
 B. -40 kJ/mol
 C. 80 kJ/mol
 D. -120 kJ/mol
- 47.** This reaction: $Ba(OH)_2(aq) + H_2SO_4(aq) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
- 48.** This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- 49.** The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- 50.** The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct



2nd Attempt

Time: 3.30 hours

Subject: Chemistry

fingerprint

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Answer the following questions: (two marks for each correct choice)

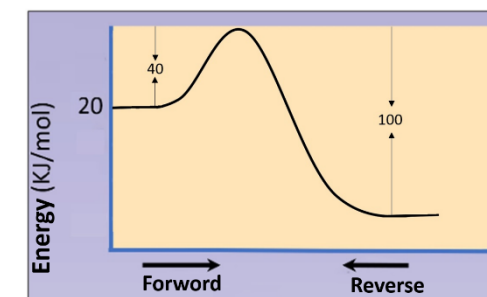
- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H₂SO₄ solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
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- Which of the following is a general formula for secondary amine?
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- A molecule forms ion by the action of solvent:-
 A. KF B. F₂ C. HF D. CH₃OH
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO₃ B. CaCl₂ C. KCl D. NH₄NO₃
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH₃ D. HF
- Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
 C. $\frac{1}{2}\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2 \text{ kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them
- How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2
- One of the following is not Bronsted-Lowry acid:-
 A. BF₃ B. HCN C. H₂SO₄ D. NH₄⁺
- The product of complete combustion of one mole of simplest alkyne is:-
 A. 2CO₂+H₂O B. CO₂+2H₂O C. 2CO₂+2H₂O D. 4CO₂+5H₂O
- Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
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15. The value of pH for carbonated beverages:-

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16. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



17. The rate of this reaction: $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

18. The value of specific rate constant of reaction increases by:-

- A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct

19. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

20. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH₃ B. NaHCO₃ C. NaOH D. both (A and C)

21. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

22. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

23. The [OH⁻] of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{ M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

24. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles

25. In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

26. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)

- 27.** An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 28.** This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ **B.** $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ **D.** None of them
- 29.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K)
A. 570 **B.** 470 **C.** 277 **D.** 550
- 30.** The Teflon is a sample of addition polymer, its monomer is:-
A. C_2F_2 **B.** CFCs **C.** C_2F_4 **D.** MTBE
- 31.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate? **A.** MgPO_4 **B.** $\text{Mg}_3(\text{PO}_4)_2$ **C.** Mg_3PO_4 **D.** KCl
- 32.** In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?
A. ΔH°_c of graphite = -393.5 kJ/mol **B.** $\Delta H^\circ = \Delta H^\circ_f$ of CO_2
C. $\Delta H^\circ = \Delta H^\circ_c$ of graphite **D.** All of them are correct
- 33.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base
- 34.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | | | | | |
|---------------------------|--------|-------|-------------|---------|
| Solvent | Phenol | Ether | Acetic acid | Camphor |
| $K_f(^{\circ}\text{C}/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 35.** In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A.** 2 **B.** 8
C. 4 **D.** 9
- 36.** This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
A. condensation **B.** addition **C.** substitution **D.** elimination
- 37.** In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH_3 **B.** OH^- **C.** H_3O^+ **D.** None of them
- 38.** Which of the following may be saturated hydrocarbon?
A. C_3H_6 **B.** C_5H_8 **C.** C_7H_8 **D.** none of them
- 39.** An ion that doesn't hydrolyze:-
A. NO_2^- **B.** CH_3COO^- **C.** ClO_4^- **D.** NH_4^+

- 40.** In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?
A. Mg^{2+} **B.** SO_4^{2-} **C.** H_3O^+ **D.** both (A and B)
- 41.** Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$?
A. HF is the acid **B.** HPO_4^{2-} is the base **C.** F^- is the conjugate base **D.** H_2PO_4^- is the conjugate base
- 42.** When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
A. the entropy of the system increases **B.** $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed **D.** all of them are correct
- 43.** The compound Freon-11 is called:-
A. trichlorofluoromethane **B.** dichlorodifluoromethane
C. chlorotrifluoromethane **D.** 3-chloro-1-fluoromethane
- 44.** In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
A. less than 2 **B.** greater than 2 **C.** equal 2 **D.** cannot be determined
- 45.** This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)
- 46.** The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{mol/L}$, then the value of K_{sp} is:-
A. 2.5×10^{-4} **B.** 5.1×10^{-4} **C.** 1.6×10^{-5} **D.** 4.1×10^{-6}
- 47.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. pH= 0.3 **B.** pH= 0 **C.** pOH= 14 **D.** both (B and C)
- 48.** In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
A. HNO_3 **B.** CH_3COOH **C.** H_2SO_4 **D.** All of them
- 49.** Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **B.** decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **D.** increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$
- 50.** The correct name for this compound: $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3 \end{array}$ according to IUPAC system is:
A. 4-methyl-2,4-butadiene **B.** 4-methyl-2,4-pentadiene
C. 2-methyl-1,3-pentadiene **D.** 2-methyl-1,3-pentene



2nd Attempt

Time: 3.30 hours

Subject: Chemistry

fingerprint

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Answer the following questions: (two marks for each correct choice)

- Which of the following reaction is always spontaneous?
 - $C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g) + \text{energy}$
 - $NH_4Cl(s) \longrightarrow NH_3(g) + HCl(g) \quad \Delta H > 0$
 - $1/2 N_2(g) + O_2(g) + 33.2 \text{ kJ} \longrightarrow NO_2(g)$
 - none of them
- Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f (^\circ\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

 - acetic acid
 - phenol
 - ether
 - camphor
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 - the entropy of the system increases
 - $[H_3O^+] = [OH^-]$
 - 0.6 moles of ions is formed
 - all of them are correct
- In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 - pH= 0.3
 - pH= 0
 - pOH= 14
 - both (B and C)
- Which of the following organic compounds that are often responsible for odors and flavors?
 - aldehyde and ketone
 - carboxylic acid and ester
 - amines
 - All of them
- The compound Freon-11 is called:-
 - trichlorofluoromethane
 - dichlorodifluoromethane
 - chlorotrifluoromethane
 - 3-chloro-1-fluoromethane
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 - condensation
 - addition
 - substitution
 - elimination
- A molecule forms ion by the action of solvent:-
 - KF
 - F_2
 - HF
 - CH_3OH
- The value of specific rate constant of reaction increases by:-
 - using catalyst
 - increasing reactant concentration
 - increasing temperature
 - both (A and C) are correct
- The rate of this reaction: $Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-
 - increasing pressure
 - increasing HCl concentration
 - increasing surface area of Zn
 - both (B and C)
- An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{ M } PCl_3$, $2.5 \times 10^{-2} \text{ M } Cl_2$ and $4.0 \times 10^{-3} \text{ M } PCl_5$, then equilibrium constant for this reaction: $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, is equal to:
 - 25
 - 0.04
 - 0.4
 - 2.5
- In this reaction: $Mg(s) + H_2SO_4(aq) \longrightarrow$, which of the following is spectator ion?
 - Mg^{2+}
 - SO_4^{2-}
 - H_3O^+
 - both (A and B)

- In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

 - 2
 - 8
 - 4
 - 9
- In the following equilibrium hypothetical gaseous reaction: $A + 3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2C + \text{energy} \rightleftharpoons A + 3B$, is:-
 - less than 2
 - greater than 2
 - equal 2
 - cannot be determined
- In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol , then the energy of product equal to:-
 - 60 kJ/mol
 - 40 kJ/mol
 - 80 kJ/mol
 - 120 kJ/mol
- One of the following is not Bronsted-Lowry acid:-
 - BF_3
 - HCN
 - H_2SO_4
 - NH_4^+
- Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 - NH_3
 - $NaHCO_3$
 - NaOH
 - both (A and C)
- Which of the following hydrocarbons is at liquid state?
 - methane
 - propane
 - 2-methylbutane
 - none of them
- The boiling-point elevation is colligative property it depends on the:-
 - nature of solute
 - concentration of solvent particles
 - nature of solvent
 - concentration of solute particles
- An ion that doesn't hydrolyze:-
 - NO_2^-
 - CH_3COO^-
 - ClO_4^-
 - NH_4^+
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 - is equal to the acid solution volume
 - is equal to half the acid solution volume
 - is equal to double the acid solution volume
 - cannot be determined
- The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 - 2.5×10^{-4}
 - 5.1×10^{-4}
 - 1.6×10^{-5}
 - 4.1×10^{-6}
- The Teflon is a sample of addition polymer, its monomer is:-
 - C_2F_2
 - CFCs
 - C_2F_4
 - MTBE
- The product of complete combustion of one mole of simplest alkyne is:-
 - $2CO_2 + H_2O$
 - $CO_2 + 2H_2O$
 - $2CO_2 + 2H_2O$
 - $4CO_2 + 5H_2O$
- In this reaction: $2C_{(\text{graphite})} + 2O_2(g) \longrightarrow 2CO_2(g) + 787 \text{ kJ}$, which of the following is correct?
 - ΔH^0_c of graphite = -393.5 kJ/mol
 - $\Delta H^0 = \Delta H^0_f$ of CO_2
 - $\Delta H^0 = \Delta H^0_c$ of graphite
 - All of them are correct

- 26.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
- A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
- 27.** The value of pH for carbonated beverages:-
- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- 28.** Which of the following organic compounds pairs is **not** a structural isomer to each other?
- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
- 29.** The anion of methanoic acid in its aqueous solution:-
- A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- 30.** Which of the following may be saturated hydrocarbon?
- A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- 31.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
- 32.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
- A. $NaNO_3$ B. $CaCl_2$ C. KCl D. NH_4NO_3
- 33.** The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- 34.** This reaction: $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is: $2NO + H_2 \longrightarrow N_2 + H_2O_2$, which of the following is the reaction of step two?
- A. $NO + H_2O_2 \longrightarrow NO_3 + H_2$ B. $H_2 + H_2O_2 \longrightarrow 2H_2O$
 C. $NO + H_2O \longrightarrow H_2 + NO_2$ D. None of them
- 35.** Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
- A. molecular formula B. general formula C. molar mass D. boiling point
- 36.** Adding a small amount of KCN to HCN solution leads to:-
- A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
- 37.** Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
- A. HCl B. KOH C. NH_3 D. HF
- 38.** The simplest ester is:-
- A. HCOOH B. HCOOCH₃ C. CH₃COOH D. CH₃COOCH₃
- 39.** In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
- A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)

- 40.** Which of the following is correct?
- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- 41.** How many grams of $Ba(OH)_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2
- 42.** In which of the following an aqueous solution acids the $[acid] > [H_3O^+]$?
- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- 43.** Which of the following statements is **not suitable** for this reaction:
 $HF(aq) + HPO_4^{2-}(aq) \longrightarrow F^-(aq) + H_2PO_4^-(aq)$
- A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. $H_2PO_4^-$ is the conjugate base
- 44.** Which of the following is a general formula for secondary amine?
- A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
- 45.** The $[OH^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} M$, then the value of ionization constant of water at the same temperature is equal to:
- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- 46.** In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
- A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- 47.** In the reaction ammonium ions with water molecule which of the following is not produced?
- A. NH_3 B. OH^- C. H_3O^+ D. None of them
- 48.** If 3.5kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron= 0.449 J/(g.K))
- A. 570 B. 470 C. 277 D. 550
- 49.** This reaction: $Ba(OH)_2(aq) + H_2SO_4(aq) \longrightarrow$, goes to completion because:
- A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
- 50.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate? A. $MgPO_4$ B. $Mg_3(PO_4)_2$ C. Mg_3PO_4 D. KCl



2nd Attempt

Subject: Chemistry
 Time: 3.30 hours

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Answer the following questions: (two marks for each correct choice)

- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH₃ D. HF
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H₂SO₄ solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- In which of the following an aqueous solution acids the [acid]>[H₃O⁺]?
 A. HNO₃ B. CH₃COOH C. H₂SO₄ D. All of them
- A molecule forms ion by the action of solvent:-
 A. KF B. F₂ C. HF D. CH₃OH
- Which of the following statements is **not suitable** for this reaction:
 $\text{HF(aq)} + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO₄²⁻ is the base C. F⁻ is the conjugate base D. H₂PO₄⁻ is the conjugate base
- In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- The Teflon is a sample of addition polymer, its monomer is:-
 A. C₂F₂ B. CFCs C. C₂F₄ D. MTBE
- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. - 0.176J/(mol.K) B. - 0.176kJ/(mol.K) C. + 0.176kJ/(mol.K) D. - 2.1kJ/(mol.K)
- In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH₃ B. OH⁻ C. H₃O⁺ D. None of them
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles

13. The solubility of PbCl₂ in its saturated solution at specified temperature is equal to 1.6x10⁻²mol/L, then the value of K_{sp} is:-

- A. 2.5x10⁻⁴ B. 5.1x10⁻⁴ C. 1.6x10⁻⁵ D. 4.1x10⁻⁶

14. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

15. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?

- A. MgPO₄ B. Mg₃(PO₄)₂ C. Mg₃PO₄ D. KCl

16. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

17. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

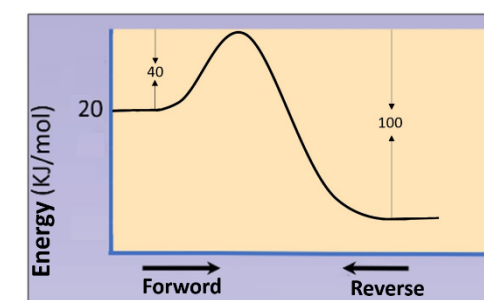
- A. condensation B. addition C. substitution D. elimination

18. An ion that doesn't hydrolyze:-

- A. NO₂⁻ B. CH₃COO⁻ C. ClO₄⁻ D. NH₄⁺

19. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



20. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane

21. In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4\text{(aq)} \longrightarrow$, which of the following is spectator ion?

- A. Mg²⁺ B. SO₄²⁻ C. H₃O⁺ D. both (A and B)

22. Which of the following is a general formula for secondary amine?

- A. (R₂N-H⁺) B. (R-NH₂) C. (R-NH-R') D. None of them

23. In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10 ⁻⁶
2	0.2	0.1	4×10 ⁻⁶
3	0.2	0.4	4×10 ⁻⁶

- A. 2 B. 8
 C. 4 D. 9

24. The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

25. The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$

- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

- 26.** The compound Freon-11 is called:-
A. trichlorofluoromethane **B.** dichlorodifluoromethane
C. chlorotrifluoromethane **D.** 3-chloro-1-fluoromethane
- 27.** Which of the following may be saturated hydrocarbon?
A. C₃H₆ **B.** C₅H₈ **C.** C₇H₈ **D.** none of them
- 28.** In the following equilibrium hypothetical gaseous reaction: $A+3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant(*K*) at 300°C is 0.5, the value of (*K*) at 200°C for this reaction: $2C + \text{energy} \rightleftharpoons A+3B$, is:-
A. less than 2 **B.** greater than 2 **C.** equal 2 **D.** cannot be determined
- 29.** Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them
- 30.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH₃ **B.** NaHCO₃ **C.** NaOH **D.** both (A and C)
- 31.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K)
A. 570 **B.** 470 **C.** 277 **D.** 550
- 32.** This reaction: $\text{Ba(OH)}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)
- 33.** One of the following is not Bronsted-Lowry acid:-
A. BF₃ **B.** HCN **C.** H₂SO₄ **D.** NH₄⁺
- 34.** The [OH⁻] of pure water at specified temperature is equal to 2.3x10⁻⁷M, then the value of ionization constant of water at the same temperature is equal to:
A. 1.0x10⁻¹⁴ **B.** 3.0x10⁻¹⁵ **C.** 5.3x10⁻¹⁴ **D.** 2.3x10⁻⁷
- 35.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
A. NaNO₃ **B.** CaCl₂ **C.** KCl **D.** NH₄NO₃
- 36.** In the 0.5M H₂SO₄ solution:- (suppose it ionized completely)
A. pH= 0.3 **B.** pH= 0 **C.** pOH= 14 **D.** both (B and C)
- 37.** An equilibrium mixture at 25°C is found to consist of 6.4x10⁻³M PCl₃, 2.5x10⁻²M Cl₂ and 4.0x10⁻³M PCl₅, then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 38.** The value of specific rate constant of reaction increases by:-
A. using catalyst **B.** increasing reactant concentration
C. increasing temperature **D.** both (A and C) are correct
- 39.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 40.** The product of complete combustion of one mole of simplest alkyne is:-
A. 2CO₂+H₂O **B.** CO₂+2H₂O **C.** 2CO₂+2H₂O **D.** 4CO₂+5H₂O

- 41.** In which of the following reactions the value of equilibrium constant(*K*) is equal to product concentration?
A. $\text{C(s)} + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ **B.** $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO(s)} + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O (g)}$ **D.** $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
- 42.** Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and [H₃O⁺] **B.** decreasing ionization of acid and increasing [H₃O⁺]
C. increasing both ionization of acid and [H₃O⁺] **D.** increasing ionization of acid and decreasing [H₃O⁺]
- 43.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base
- 44.** This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ **B.** $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ **D.** None of them
- 45.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | | | | | |
|-----------------------|--------|-------|-------------|---------|
| Solvent | Phenol | Ether | Acetic acid | Camphor |
| K _f (°C/m) | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 46.** When 0.3 moles of potassium nitrate (KNO₃) dissolves in water, which of the following is correct?
A. the entropy of the system increases **B.** [H₃O⁺]=[OH⁻]
C. 0.6 moles of ions is formed **D.** all of them are correct
- 47.** The simplest ester is:-
A. HCOOH **B.** HCOOCH₃ **C.** CH₃COOH **D.** CH₃COOCH₃
- 48.** How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol) **A.** 3.42 **B.** 1.71 **C.** 17.1 **D.** 34.2
- 49.** Which of the following reaction is always spontaneous?
A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ **B.** $\text{NH}_4\text{Cl(s)} \longrightarrow \text{NH}_3(\text{g}) + \text{HCl(g)}$ $\Delta H > 0$
C. $\frac{1}{2}\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ **D.** none of them
- 50.** In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?
A. ΔH^0_c of graphite = -393.5 kJ/mol **B.** $\Delta H^0 = \Delta H^0_f$ of CO₂
C. $\Delta H^0 = \Delta H^0_c$ of graphite **D.** All of them are correct



2nd Attempt

Subject: Chemistry

Time: 3.30 hours

fingerprint

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Answer the following questions: (two marks for each correct choice)

1. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

2. One of the following is not Bronsted-Lowry acid:-

- A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

3. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

4. The value of specific rate constant of reaction increases by:-

- A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct

5. The simplest ester is:-

- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

6. Adding a small amount of KCN to HCN solution leads to:-

- A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
 C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

7. The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

8. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

9. This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:

$2\text{NO} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?

- A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them

10. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

11. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

12. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base

13. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4\text{(g)} + \text{H}_2\text{(g)} \rightarrow \text{C}_2\text{H}_6\text{(g)} + \text{energy}$ B. $\text{NH}_4\text{Cl(s)} \rightarrow \text{NH}_3\text{(g)} + \text{HCl(g)}$ $\Delta H > 0$
 C. $1/2\text{N}_2\text{(g)} + \text{O}_2\text{(g)} + 33.2\text{kJ} \rightarrow \text{NO}_2\text{(g)}$ D. none of them

14. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. $\text{C(s)} + \text{O}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(g)}$ B. $\text{CaCO}_3\text{(s)} \rightleftharpoons \text{CaO(s)} + \text{CO}_2\text{(g)}$
 C. $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{H}_2\text{O(g)}$ D. $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$

15. How many grams of Ba(OH)_2 must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol)

- A. 3.42 B. 1.71 C. 17.1 D. 34.2

16. Which of the following statements is **not** suitable for this reaction:

$\text{HF(aq)} + \text{HPO}_4^{2-}(\text{aq}) \rightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$

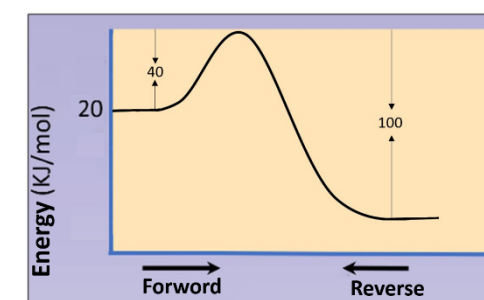
- A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base

17. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)

18. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



19. The compound Freon-11 is called:-

- A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

20. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

21. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)

22. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles

23. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

24. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?

- A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl

25. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K))

- A. 570 B. 470 C. 277 D. 550

26. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

27. In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

- A. 2 B. 8
C. 4 D. 9

28. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?

- A. HCl B. KOH C. NH_3 D. HF

29. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
C. pentane and cyclopentane D. pentane and 2-methyl butane

30. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

31. The correct name for this compound: $\begin{array}{c} \text{CH}_3 \\ | \\ (\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3) \end{array}$ according to IUPAC system is:

- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

32. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

33. Which of the following may be saturated hydrocarbon?

- A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them

34. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

35. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

- A. acetic acid B. phenol
C. ether D. camphor

36. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

37. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-

- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}

38. In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)

39. In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-

- A. $-0.176 \text{ J}/(\text{mol.K})$ B. $-0.176 \text{ kJ}/(\text{mol.K})$ C. $+0.176 \text{ kJ}/(\text{mol.K})$ D. $-2.1 \text{ kJ}/(\text{mol.K})$

40. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)

- A. $\text{pH} = 0.3$ B. $\text{pH} = 0$ C. $\text{pOH} = 14$ D. both (B and C)

41. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{ M}$ PCl_3 , $2.5 \times 10^{-2} \text{ M}$ Cl_2 and $4.0 \times 10^{-3} \text{ M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

42. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

43. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
C. formation of precipitate D. Both (B and C)

44. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

45. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?

- A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed D. all of them are correct

46. The product of complete combustion of one mole of simplest alkyne is:-

- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

47. In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

48. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?

- A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct

49. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

50. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-

- A. is equal to the acid solution volume B. is equal to half the acid solution volume
C. is equal to double the acid solution volume D. cannot be determined



2nd Attempt

Time: 3.30 hours

Subject: Chemistry

fingerprint

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Answer the following questions: (two marks for each correct choice)

- Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
- In which of the following an aqueous solution acids the $[acid] > [H_3O^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2 + H_2O$ B. $CO_2 + 2H_2O$ C. $2CO_2 + 2H_2O$ D. $4CO_2 + 5H_2O$
- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The simplest ester is:-
 A. HCOOH B. $HCOOCH_3$ C. CH_3COOH D. CH_3COOCH_3
- Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
- An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- In this reaction: $Mg(s) + H_2SO_4(aq) \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
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17. This reaction: $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is:

$2NO + H_2 \longrightarrow N_2 + H_2O_2$, which of the following is the reaction of step two?

- A. $NO + H_2O_2 \longrightarrow NO_3 + H_2$ B. $H_2 + H_2O_2 \longrightarrow 2H_2O$
 C. $NO + H_2O \longrightarrow H_2 + NO_2$ D. None of them

18. In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
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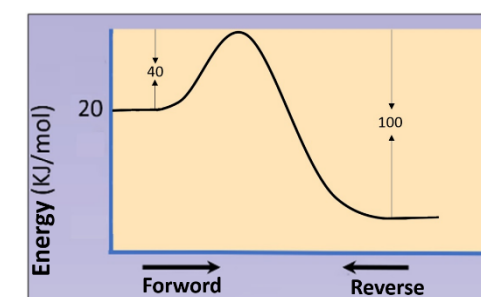
- A. - 0.176J/(mol.K) B. - 0.176kJ/(mol.K) C. + 0.176kJ/(mol.K) D. - 2.1kJ/(mol.K)

22. The rate of this reaction: $Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

23. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-

- A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



24. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

25. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. $NaNO_3$ B. $CaCl_2$ C. KCl D. NH_4NO_3

26. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane

27. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

- 28.** The value of specific rate constant of reaction increases by:-
A. using catalyst **B.** increasing reactant concentration
C. increasing temperature **D.** both (A and C) are correct
- 29.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 30.** This reaction: $\text{Ba(OH)}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)
- 31.** Which of the following reaction is always spontaneous?
A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ **B.** $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \quad \Delta H > 0$
C. $\frac{1}{2}\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ **D.** none of them
- 32.** The correct name for this compound: $\begin{matrix} \text{CH}_3 \\ | \\ (\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3) \end{matrix}$ according to IUPAC system is:
A. 4-methyl-2,4-butadiene **B.** 4-methyl-2,4-pentadiene
C. 2-methyl-1,3-pentadiene **D.** 2-methyl-1,3-pentene
- 33.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base
- 34.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH_3 **B.** NaHCO_3 **C.** NaOH **D.** both (A and C)
- 35.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ **B.** $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ **D.** $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
- 36.** Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
A. molecular formula **B.** general formula **C.** molar mass **D.** boiling point
- 37.** Which of the following is correct?
A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. **D.** All of them
- 38.** A molecule forms ion by the action of solvent:-
A. KF **B.** F_2 **C.** HF **D.** CH_3OH
- 39.** In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

- 40.** When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
A. the entropy of the system increases **B.** $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed **D.** all of them are correct
- 41.** An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 42.** The value of pH for carbonated beverages:-
A. is equal to 7 **B.** less than 7 **C.** greater than 7 **D.** cannot be determined
- 43.** The compound Freon-11 is called:-
A. trichlorofluoromethane **B.** dichlorodifluoromethane
C. chlorotrifluoromethane **D.** 3-chloro-1-fluoromethane
- 44.** Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
A. HF is the acid **B.** HPO_4^{2-} is the base **C.** F^- is the conjugate base **D.** H_2PO_4^- is the conjugate base
- 45.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron = $0.449\text{J}/(\text{g}\cdot\text{K})$)
A. 570 **B.** 470 **C.** 277 **D.** 550
- 46.** The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:
A. 1.0×10^{-14} **B.** 3.0×10^{-15} **C.** 5.3×10^{-14} **D.** 2.3×10^{-7}
- 47.** The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-
A. 2.5×10^{-4} **B.** 5.1×10^{-4} **C.** 1.6×10^{-5} **D.** 4.1×10^{-6}
- 48.** In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5 , the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
A. less than 2 **B.** greater than 2 **C.** equal 2 **D.** cannot be determined
- 49.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | | | | | |
|---------------------------|--------|-------|-------------|---------|
| Solvent | Phenol | Ether | Acetic acid | Camphor |
| $K_f(^{\circ}\text{C}/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 50.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. pH= 0.3 **B.** pH= 0 **C.** pOH= 14 **D.** both (B and C)



2nd Attempt

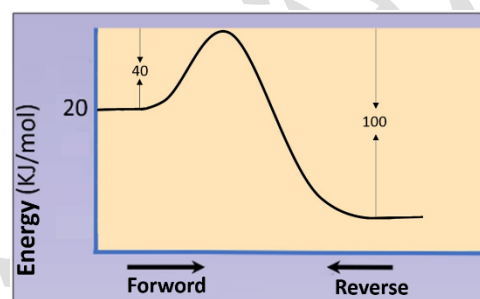
Subject: Chemistry
 Time: 3.30 hours

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Answer the following questions: (two marks for each correct choice)

- Which of the following statements is **not** suitable for this reaction:
 $\text{HF(aq)} + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
- A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
- In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)
- In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-
 A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol



- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

- This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
- The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
- In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. $\text{C(s)} + \text{O}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(g)}$ B. $\text{CaCO}_3\text{(s)} \rightleftharpoons \text{CaO(s)} + \text{CO}_2\text{(g)}$
 C. $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{H}_2\text{O(g)}$ D. $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$
- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
- How many grams of Ba(OH)_2 must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2
- The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

- 26.** Which of the following may be saturated hydrocarbon?
A. C₃H₆ **B.** C₅H₈ **C.** C₇H₈ **D.** none of them
- 27.** The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base
- 28.** An equilibrium mixture at 25°C is found to consist of 6.4x10⁻³M PCl₃, 2.5x10⁻²M Cl₂ and 4.0x10⁻³M PCl₅, then equilibrium constant for this reaction: PCl₅(g) $\rightleftharpoons$ PCl₃(g) + Cl₂(g), is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 29.** In this reaction: 2C_(graphite) + 2O₂(g) $\longrightarrow$ 2CO₂(g)+787kJ, which of the following is correct?
A. ΔH⁰_C of graphite = -393.5 kJ/mol **B.** ΔH⁰ = ΔH⁰_f of CO₂
C. ΔH⁰ = ΔH⁰_C of graphite **D.** All of them are correct
- 30.** In a reaction, ΔG⁰ = - 4.7 kJ/mol and ΔH⁰ = -57.2 kJ/mol, then the value of ΔS⁰ at room temperature is equal to:-
A. - 0.176J/(mol.K) **B.** - 0.176kJ/(mol.K) **C.** + 0.176kJ/(mol.K) **D.** - 2.1kJ/(mol.K)
- 31.** In this hypothetical reaction: A + B $\longrightarrow$ C, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10 ⁻⁶ |
| 2 | 0.2 | 0.1 | 4×10 ⁻⁶ |
| 3 | 0.2 | 0.4 | 4×10 ⁻⁶ |
- A.** 2 **B.** 8
C. 4 **D.** 9
- 32.** The simplest ester is:-
A. HCOOH **B.** HCOOCH₃ **C.** CH₃COOH **D.** CH₃COOCH₃
- 33.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH₃ **B.** NaHCO₃ **C.** NaOH **D.** both (A and C)
- 34.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 35.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
A. NaNO₃ **B.** CaCl₂ **C.** KCl **D.** NH₄NO₃
- 36.** In this reaction: Mg(s)+H₂SO₄(aq) $\longrightarrow$, which of the following is spectator ion?
A. Mg²⁺ **B.** SO₄²⁻ **C.** H₃O⁺ **D.** both (A and B)
- 37.** Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them
- 38.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate? **A.** MgPO₄ **B.** Mg₃(PO₄)₂ **C.** Mg₃PO₄ **D.** KCl
- 39.** This reaction: Ba(OH)₂(aq)+H₂SO₄(aq) $\longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)

- 40.** In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH₃ **B.** OH⁻ **C.** H₃O⁺ **D.** None of them
- 41.** The product of complete combustion of one mole of simplest alkyne is:-
A. 2CO₂+H₂O **B.** CO₂+2H₂O **C.** 2CO₂+2H₂O **D.** 4CO₂+5H₂O
- 42.** Which of the following reaction is always spontaneous?
A. C₂H₄(g)+ H₂(g) $\longrightarrow$ C₂H₆(g)+ energy **B.** NH₄Cl(s) $\longrightarrow$ NH₃(g)+ HCl(g) ΔH>0
C. 1/2N₂(g)+ O₂(g) +33.2kJ $\longrightarrow$ NO₂(g) **D.** none of them
- 43.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|-----------------------|--------|-------|-------------|---------|
| K _f (°C/m) | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 44.** Which of the following is a general formula for secondary amine?
A. (R₂N-H⁺) **B.** (R-NH₂) **C.** (R-NH-R') **D.** None of them
- 45.** The solubility of PbCl₂ in its saturated solution at specified temperature is equal to 1.6x10⁻²mol/L, then the value of K_{sp} is:-
A. 2.5x10⁻⁴ **B.** 5.1x10⁻⁴ **C.** 1.6x10⁻⁵ **D.** 4.1x10⁻⁶
- 46.** In which of the following an aqueous solution acids the [acid]>[H₃O⁺]?
A. HNO₃ **B.** CH₃COOH **C.** H₂SO₄ **D.** All of them
- 47.** The Teflon is a sample of addition polymer, its monomer is:-
A. C₂F₂ **B.** CFCs **C.** C₂F₄ **D.** MTBE
- 48.** Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and [H₃O⁺] **B.** decreasing ionization of acid and increasing [H₃O⁺]
C. increasing both ionization of acid and [H₃O⁺] **D.** increasing ionization of acid and decreasing [H₃O⁺]
- 49.** Which of the following is correct?
A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. **D.** All of them
- 50.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron=0.449J/(g.K)
A. 570 **B.** 470 **C.** 277 **D.** 550



2nd Attempt

Subject: Chemistry

Time: 3.30 hours

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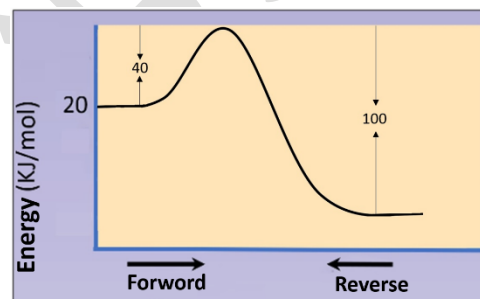
Answer the following questions: (two marks for each correct choice)

- In the following equilibrium hypothetical gaseous reaction: $A+3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2C + \text{energy} \rightleftharpoons A+3B$, is:-
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- Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
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- The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- Which of the following organic compounds that are often responsible for odors and flavors?
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- In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
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 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
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- In this hypothetical reaction: $A+B \rightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

- In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol , then the energy of product equal to:-

- A. - 60 kJ/mol
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- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
- An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{ M PCl}_3$, $2.5 \times 10^{-2} \text{ M Cl}_2$ and $4.0 \times 10^{-3} \text{ M PCl}_5$, then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
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- Adding a small amount of KCN to HCN solution leads to:-
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- In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
- Which of the following is a general formula for secondary amine?
 A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them
- Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
- The required volume of 0.4 M NaOH to neutralize 200 mL of $0.2 \text{ M H}_2\text{SO}_4$ solution :-
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- If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10 kJ/mol , which of the following is decreased with the same amount?
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 A. molecular formula B. general formula C. molar mass D. boiling point
- If 3.5 kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron = 0.449 J/(g.K))
 A. 570 B. 470 C. 277 D. 550
- In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?
 A. $\Delta H^\circ_{\text{C}}$ of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_{\text{f}}$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_{\text{C}}$ of graphite D. All of them are correct
- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- A molecule forms ion by the action of solvent:-
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- The value of pH for carbonated beverages:-
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2nd Attempt

Time: 3.30 hours

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- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \rightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \rightarrow \text{NO}_2(\text{g})$ D. none of them
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 - This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
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 A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them
 - Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF

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 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- The simplest ester is:-
 A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$
- How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass= 171g/mol)
 A. 3.42 B. 1.71 C. 17.1 D. 34.2

- 27.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
- A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
- 28.** The product of complete combustion of one mole of simplest alkyne is:-
- A. $2CO_2 + H_2O$ B. $CO_2 + 2H_2O$ C. $2CO_2 + 2H_2O$ D. $4CO_2 + 5H_2O$
- 29.** The $[OH^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} M$, then the value of ionization constant of water at the same temperature is equal to:
- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- 30.** Adding a small amount of KCN to HCN solution leads to:-
- A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
- 31.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
- A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
- 32.** Which of the following is correct?
- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- 33.** The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
- A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- 34.** The boiling-point elevation is colligative property it depends on the:-
- A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- 35.** The rate of this reaction: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-
- A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
- 36.** In this reaction: $Mg(s) + H_2SO_4(aq) \rightarrow$, which of the following is spectator ion?
- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- 37.** Which of the following may be saturated hydrocarbon?
- A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- 38.** In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
- A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
- 39.** The correct name for this compound: $\begin{array}{c} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{array}$ according to IUPAC system is:
- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

40. In this reaction: $2C_{(graphite)} + 2O_2(g) \rightarrow 2CO_2(g) + 787 \text{ kJ}$, which of the following is correct?

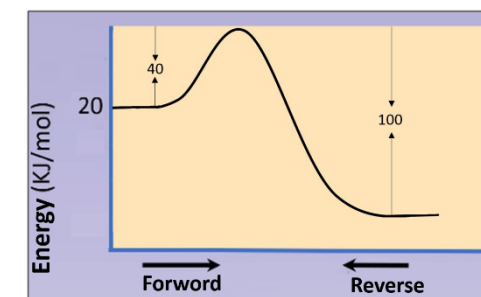
- A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
 C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct

41. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

42. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-

- A. -60 kJ/mol
 B. -40 kJ/mol
 C. 80 kJ/mol
 D. -120 kJ/mol



43. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?

- A. the entropy of the system increases B. $[H_3O^+] = [OH^-]$
 C. 0.6 moles of ions is formed D. all of them are correct

44. In which of the following an aqueous solution acids the $[acid] > [H_3O^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

45. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

46. This reaction: $Ba(OH)_2(aq) + H_2SO_4(aq) \rightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)

47. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at $7.8^\circ C$ below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid B. phenol
 C. ether D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}C/m)$	-7.40	-1.79	-3.9	-39.7

48. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH_3 B. $NaHCO_3$ C. $NaOH$ D. both (A and C)

49. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

50. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE



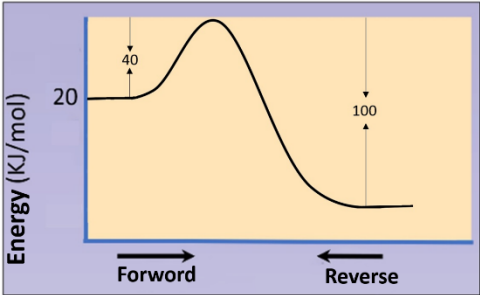
Answer the following questions: (two marks for each correct choice)

- The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[H_3O^+] = [OH^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
- In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- This reaction: (ethanoic acid + methanol $\rightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- In this hypothetical reaction: $A + B \rightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. $NaNO_3$ B. $CaCl_2$ C. KCl D. NH_4NO_3

- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
 - Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at $7.8^\circ C$ below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|--------------------|--------|-------|-------------|---------|
| $K_f (^\circ C/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- acetic acid B. phenol
 C. ether D. camphor
 - The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} mol/L$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
 - The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2 + H_2O$ B. $CO_2 + 2H_2O$ C. $2CO_2 + 2H_2O$ D. $4CO_2 + 5H_2O$
 - Which of the following reaction is always spontaneous?
 A. $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g) + \text{energy}$ B. $NH_4Cl(s) \rightarrow NH_3(g) + HCl(g)$ $\Delta H > 0$
 C. $1/2 N_2(g) + O_2(g) + 33.2 kJ \rightarrow NO_2(g)$ D. none of them
 - In the following equilibrium hypothetical gaseous reaction: $A + 3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant (K) at $300^\circ C$ is 0.5, the value of (K) at $200^\circ C$ for this reaction: $2C + \text{energy} \rightleftharpoons A + 3B$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
 - Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. $NaHCO_3$ C. NaOH D. both (A and C)
 - Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
 - In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?
 A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
 - The simplest ester is:-
 A. HCOOH B. $HCOOCH_3$ C. CH_3COOH D. CH_3COOCH_3
 - If 3.5kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron = $0.449 J/(g.K)$)
 A. 570 B. 470 C. 277 D. 550
 - If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
 - The rate of this reaction: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)

25. In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
26. The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
27. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol ,then the energy of product equal to:-
 A. - 60kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol
- 
28. In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
29. Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
30. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
31. Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
32. The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
33. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
34. This reaction: $\text{Ba(OH)}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
35. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
36. In a reaction, $\Delta G^\circ = -4.7 \text{ kJ/mol}$ and $\Delta H^\circ = -57.2 \text{ kJ/mol}$, then the value of ΔS° at room temperature is equal to:-
 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
37. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
38. One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

39. How many grams of Ba(OH)_2 must be dissolved in 200mL of water to make a solution with pH 13? (molar mass= 171 g/mol)
 A. 3.42 B. 1.71 C. 17.1 D. 34.2
40. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?
 A. $\Delta H^\circ_{\text{c}}$ of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_{\text{f}}$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_{\text{c}}$ of graphite D. All of them are correct
41. The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
42. This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
43. Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
44. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)
45. Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
46. An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
47. Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
48. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
 C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$
49. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
50. Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane



2nd Attempt

Subject: Chemistry

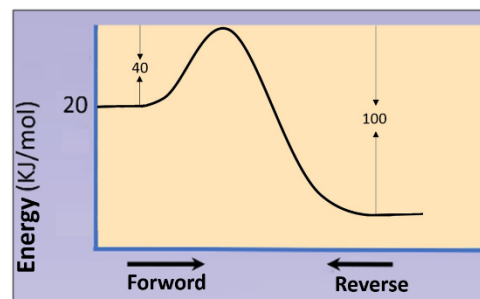
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Answer the following questions: (two marks for each correct choice)

- An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
 - This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
 - The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
 - In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
 A. 2 B. 8 C. 4 D. 9
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol, then the energy of product equal to:-
 A. - 60 kJ/mol
 B. - 40 kJ/mol
 C. 80 kJ/mol
 D. - 120 kJ/mol
 - The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
 - The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
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 - A molecule forms ion by the action of solvent:-
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 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
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 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them



- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
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- If 3.5 kJ of energy are added to a 28.1 g sample of iron at 20°C, what is the final temperature of the iron in kelvins? (if the specific heat of iron = 0.449 J/(g.K))
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- In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
- This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
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- How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200 mL of water to make a solution with pH 13? (molar mass = 171 g/mol)
 A. 3.42 B. 1.71 C. 17.1 D. 34.2
- This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is: $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- Which of the following statements is **not** suitable for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$?
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- Which of the following organic compounds pairs is **not** a structural isomer to each other?
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- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

- 26.** The value of specific rate constant of reaction increases by:-
A. using catalyst **B.** increasing reactant concentration
C. increasing temperature **D.** both (A and C) are correct
- 27.** When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
A. the entropy of the system increases **B.** $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed **D.** all of them are correct
- 28.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. pH= 0.3 **B.** pH= 0 **C.** pOH= 14 **D.** both (B and C)
- 29.** In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- 30.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ **B.** $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ **D.** $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
- 31.** Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
A. molecular formula **B.** general formula **C.** molar mass **D.** boiling point
- 32.** Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them
- 33.** In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
A. -0.176 J/(mol.K) **B.** $-0.176 \text{ kJ/(mol.K)}$ **C.** $+0.176 \text{ kJ/(mol.K)}$ **D.** -2.1 kJ/(mol.K)
- 34.** Which of the following is a general formula for secondary amine?
A. $(\text{R}_2\text{N}-\text{H}^+)$ **B.** $(\text{R}-\text{NH}_2)$ **C.** $(\text{R}-\text{NH}-\text{R}')$ **D.** None of them
- 35.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 36.** In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH_3 **B.** OH^- **C.** H_3O^+ **D.** None of them
- 37.** The simplest ester is:-
A. HCOOH **B.** HCOOCH_3 **C.** CH_3COOH **D.** $\text{CH}_3\text{COOCH}_3$
- 38.** When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate? **A.** MgPO_4 **B.** $\text{Mg}_3(\text{PO}_4)_2$ **C.** Mg_3PO_4 **D.** KCl
- 39.** In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?
A. Mg^{2+} **B.** SO_4^{2-} **C.** H_3O^+ **D.** both (A and B)
- 40.** The product of complete combustion of one mole of simplest alkyne is:-
A. $2\text{CO}_2 + \text{H}_2\text{O}$ **B.** $\text{CO}_2 + 2\text{H}_2\text{O}$ **C.** $2\text{CO}_2 + 2\text{H}_2\text{O}$ **D.** $4\text{CO}_2 + 5\text{H}_2\text{O}$

- 41.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH_3 **B.** NaHCO_3 **C.** NaOH **D.** both (A and C)
- 42.** Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **B.** decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **D.** increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$
- 43.** An ion that doesn't hydrolyze:-
A. NO_2^- **B.** CH_3COO^- **C.** ClO_4^- **D.** NH_4^+
- 44.** The rate of this reaction: $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-
A. increasing pressure **B.** increasing HCl concentration
C. increasing surface area of Zn **D.** both (B and C)
- 45.** Which of the following reaction is always spontaneous?
A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ **B.** $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \quad \Delta H > 0$
C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2 \text{ kJ} \longrightarrow \text{NO}_2(\text{g})$ **D.** none of them
- 46.** The Teflon is a sample of addition polymer, its monomer is:-
A. C_2F_2 **B.** CFCs **C.** C_2F_4 **D.** MTBE
- 47.** The value of pH for carbonated beverages:-
A. is equal to 7 **B.** less than 7 **C.** greater than 7 **D.** cannot be determined
- 48.** Which of the following is correct?
A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. **D.** All of them
- 49.** Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|---------------------------|--------|-------|-------------|---------|
| $K_f(^{\circ}\text{C}/m)$ | -7.40 | -1.79 | -3.9 | -39.7 |
- A.** acetic acid **B.** phenol
C. ether **D.** camphor
- 50.** In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?
A. ΔH^0_c of graphite = -393.5 kJ/mol **B.** $\Delta H^0 = \Delta H^0_f$ of CO_2
C. $\Delta H^0 = \Delta H^0_c$ of graphite **D.** All of them are correct



2nd Attempt

Subject: Chemistry
 Time: 3.30 hours

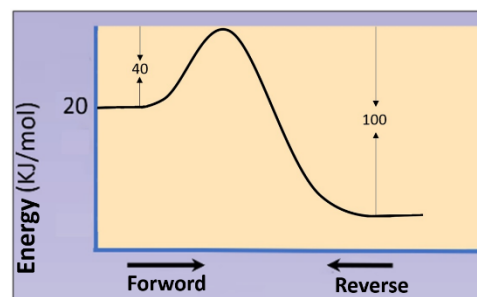
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Answer the following questions: (two marks for each correct choice)

1. In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol, then the energy of product equal to:-

- A. - 60 kJ/mol
- B. - 40 kJ/mol
- C. 80 kJ/mol
- D. - 120 kJ/mol



2. In this reaction: $2C_{(graphite)} + 2O_2(g) \rightarrow 2CO_2(g) + 787 kJ$, which of the following is correct?

- A. ΔH^0_c of graphite = -393.5 kJ/mol
- B. $\Delta H^0 = \Delta H^0_f$ of CO_2
- C. $\Delta H^0 = \Delta H^0_c$ of graphite
- D. All of them are correct

3. In which of the following an aqueous solution acids the $[acid] > [H_3O^+]$?

- A. HNO_3
- B. CH_3COOH
- C. H_2SO_4
- D. All of them

4. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute
- B. concentration of solvent particles
- C. nature of solvent
- D. concentration of solute particles

5. The compound Freon-11 is called:-

- A. trichlorofluoromethane
- B. dichlorodifluoromethane
- C. chlorotrifluoromethane
- D. 3-chloro-1-fluoromethane

6. In the following equilibrium hypothetical gaseous reaction: $A + 3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant (K) at $300^\circ C$ is 0.5, the value of (K) at $200^\circ C$ for this reaction: $2C + \text{energy} \rightleftharpoons A + 3B$, is:-

- A. less than 2
- B. greater than 2
- C. equal 2
- D. cannot be determined

7. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?

- A. $MgPO_4$
- B. $Mg_3(PO_4)_2$
- C. Mg_3PO_4
- D. KCl

8. This reaction: $2NO + 2H_2 \rightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is:

$2NO + H_2 \rightarrow N_2 + H_2O_2$, which of the following is the reaction of step two?

- A. $NO + H_2O_2 \rightarrow NO_3 + H_2$
- B. $H_2 + H_2O_2 \rightarrow 2H_2O$
- C. $NO + H_2O \rightarrow H_2 + NO_2$
- D. None of them

9. One of the following is not Bronsted-Lowry acid:-

- A. BF_3
- B. HCN
- C. H_2SO_4
- D. NH_4^+

10. The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:

- A. 4-methyl-2,4-butadiene
- B. 4-methyl-2,4-pentadiene
- C. 2-methyl-1,3-pentadiene
- D. 2-methyl-1,3-pentene

11. The rate of this reaction: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$, is increased by:-

- A. increasing pressure
- B. increasing HCl concentration
- C. increasing surface area of Zn
- D. both (B and C)

12. In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-

- A. - 0.176 J/(mol.K)
- B. - 0.176 kJ/(mol.K)
- C. + 0.176 kJ/(mol.K)
- D. - 2.1 kJ/(mol.K)

13. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?

- A. the entropy of the system increases
- B. $[H_3O^+] = [OH^-]$
- C. 0.6 moles of ions is formed
- D. all of them are correct

14. The simplest ester is:-

- A. $HCOOH$
- B. $HCOOCH_3$
- C. CH_3COOH
- D. CH_3COOCH_3

15. In the reaction ammonium ions with water molecule which of the following is not produced?

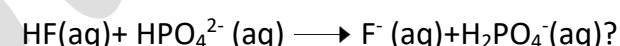
- A. NH_3
- B. OH^-
- C. H_3O^+
- D. None of them

16. Two moles of a nonelectrolyte solute are dissolved in 1 kg of an unknown solvent, the solution freezes at $7.8^\circ C$ below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid
- B. phenol
- C. ether
- D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f (^\circ C/m)$	-7.40	-1.79	-3.9	-39.7

17. Which of the following statements is **not** suitable for this reaction:



- A. HF is the acid
- B. HPO_4^{2-} is the base
- C. F^- is the conjugate base
- D. $H_2PO_4^-$ is the conjugate base

18. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?

- A. HCl
- B. KOH
- C. NH_3
- D. HF

19. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane
- B. hexene and cyclohexane
- C. pentane and cyclopentane
- D. pentane and 2-methyl butane

20. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-

- A. is equal to the acid solution volume
- B. is equal to half the acid solution volume
- C. is equal to double the acid solution volume
- D. cannot be determined

21. If 3.5 kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron = 0.449 J/(g.K))

- A. 570
- B. 470
- C. 277
- D. 550

22. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH_3
- B. $NaHCO_3$
- C. NaOH
- D. both (A and C)

23. Which of the following may be saturated hydrocarbon?

- A. C_3H_6
- B. C_5H_8
- C. C_7H_8
- D. none of them

24. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)

- A. pH = 0.3
- B. pH = 0
- C. pOH = 14
- D. both (B and C)

25. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

26. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
C. energy level of reactant D. both (A and C)

27. In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

- A. 2 B. 8
C. 4 D. 9

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

28. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

29. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

30. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

31. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

32. How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass= 171g/mol)

- A. 3.42 B. 1.71 C. 17.1 D. 34.2

33. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{mol/L}$, then the value of K_{sp} is:-

- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}

34. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
C. formation of precipitate D. Both (B and C)

35. The value of specific rate constant of reaction increases by:-

- A. using catalyst B. increasing reactant concentration
C. increasing temperature D. both (A and C) are correct

36. Adding a small amount of KCN to HCN solution leads to:-

- A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

37. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

38. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric B. has little tendency to attract a proton
C. is Bronsted-Lowry base D. is Arrhenius base

39. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

40. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

41. In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

42. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

43. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

44. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

45. The product of complete combustion of one mole of simplest alkyne is:-

- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

46. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

47. In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)

48. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3} \text{M}$ PCl_3 , $2.5 \times 10^{-2} \text{M}$ Cl_2 and $4.0 \times 10^{-3} \text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

49. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them

50. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$



2nd Attempt

Subject: Chemistry
 Time: 3.30 hours

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Answer the following questions: (two marks for each correct choice)

- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
- The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
- In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

13. In this hypothetical reaction: $\text{A} + \text{B} \rightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

14. The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

15. The correct name for this compound: CH_3 according to IUPAC system is:
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

16. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C/m})$	-7.40	-1.79	-3.9	-39.7

- A. acetic acid B. phenol
 C. ether D. camphor
17. The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
18. This reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \rightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{NO}_2$ D. None of them
19. Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
20. Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl(s)} \rightarrow \text{NH}_3(\text{g}) + \text{HCl(g)}$ $\Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \rightarrow \text{NO}_2(\text{g})$ D. none of them
21. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
22. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
23. An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

- 24.** In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- 25.** Which of the following organic compounds pairs is **not** a structural isomer to each other?
A. pentane and 2,2-di methyl propane **B.** hexene and cyclohexane
C. pentane and cyclopentane **D.** pentane and 2-methyl butane
- 26.** In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?
A. $\Delta H^\circ_{\text{C}}$ of graphite = -393.5 kJ/mol **B.** $\Delta H^\circ = \Delta H^\circ_{\text{f}}$ of CO_2
C. $\Delta H^\circ = \Delta H^\circ_{\text{C}}$ of graphite **D.** All of them are correct
- 27.** Is a chemical compound that is useful for all types of general cleaning and that ionized:-
A. NH_3 **B.** NaHCO_3 **C.** NaOH **D.** both (A and C)
- 28.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
A. enthalpy change **B.** reverse activation energy
C. energy level of reactant **D.** both (A and C)
- 29.** A molecule forms ion by the action of solvent:-
A. KF **B.** F_2 **C.** HF **D.** CH_3OH
- 30.** In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?
A. Mg^{2+} **B.** SO_4^{2-} **C.** H_3O^+ **D.** both (A and B)
- 31.** If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron = $0.449\text{J}/(\text{g}\cdot\text{K})$)
A. 570 **B.** 470 **C.** 277 **D.** 550
- 32.** This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
A. condensation **B.** addition **C.** substitution **D.** elimination
- 33.** The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-
A. 2.5×10^{-4} **B.** 5.1×10^{-4} **C.** 1.6×10^{-5} **D.** 4.1×10^{-6}
- 34.** The simplest ester is:-
A. HCOOH **B.** HCOOCH_3 **C.** CH_3COOH **D.** $\text{CH}_3\text{COOCH}_3$
- 35.** An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
A. 25 **B.** 0.04 **C.** 0.4 **D.** 2.5
- 36.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
A. $\text{pH} = 0.3$ **B.** $\text{pH} = 0$ **C.** $\text{pOH} = 14$ **D.** both (B and C)
- 37.** In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ **B.** $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ **D.** $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

38. How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass = 171g/mol) **A.** 3.42 **B.** 1.71 **C.** 17.1 **D.** 34.2

39. Which of the following hydrocarbons is at liquid state?
A. methane **B.** propane **C.** 2-methylbutane **D.** none of them

40. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
A. formation of a gas **B.** formation of a slightly ionized product
C. formation of precipitate **D.** Both (B and C)

41. Which of the following statements is **not** suitable for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
A. HF is the acid **B.** HPO_4^{2-} is the base **C.** F^- is the conjugate base **D.** H_2PO_4^- is the conjugate base

42. Adding a small amount of KCN to HCN solution leads to:-
A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **B.** decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ **D.** increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

43. Which of the following is a general formula for secondary amine?
A. $(\text{R}_2\text{N}-\text{H}^+)$ **B.** $(\text{R}-\text{NH}_2)$ **C.** $(\text{R}-\text{NH}-\text{R}')$ **D.** None of them

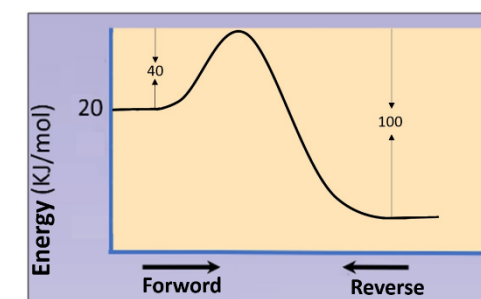
44. The Teflon is a sample of addition polymer, its monomer is:-
A. C_2F_2 **B.** CFCs **C.** C_2F_4 **D.** MTBE

45. The product of complete combustion of one mole of simplest alkyne is:-
A. $2\text{CO}_2 + \text{H}_2\text{O}$ **B.** $\text{CO}_2 + 2\text{H}_2\text{O}$ **C.** $2\text{CO}_2 + 2\text{H}_2\text{O}$ **D.** $4\text{CO}_2 + 5\text{H}_2\text{O}$

46. In the reaction ammonium ions with water molecule which of the following is not produced?
A. NH_3 **B.** OH^- **C.** H_3O^+ **D.** None of them

47. Which of the following may be saturated hydrocarbon?
A. C_3H_6 **B.** C_5H_8 **C.** C_7H_8 **D.** none of them

48. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-
A. - 60kJ/mol
B. - 40 kJ/mol
C. 80 kJ/mol
D. - 120 kJ/mol



49. The boiling-point elevation is colligative property it depends on the:-
A. nature of solute **B.** concentration of solvent particles
C. nature of solvent **D.** concentration of solute particles

50. The anion of methanoic acid in its aqueous solution:-
A. is amphoteric **B.** has little tendency to attract a proton
C. is Bronsted-Lowry base **D.** is Arrhenius base



2nd Attempt

Time: 3.30 hours

fingerprint



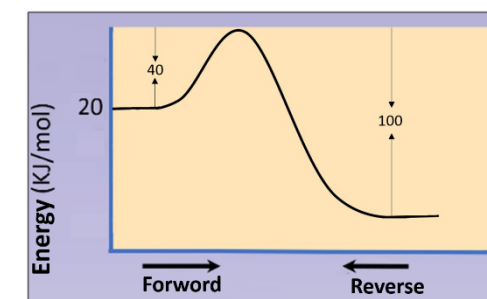
Answer the following questions: (two marks for each correct choice)

- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H₂SO₄ solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
 - Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)
 A. acetic acid B. phenol
 C. ether D. camphor
- | Solvent | Phenol | Ether | Acetic acid | Camphor |
|-----------------------|--------|-------|-------------|---------|
| K _f (°C/m) | -7.40 | -1.79 | -3.9 | -39.7 |
- An equilibrium mixture at 25°C is found to consist of 6.4x10⁻³M PCl₃, 2.5x10⁻²M Cl₂ and 4.0x10⁻³M PCl₅, then equilibrium constant for this reaction: PCl₅(g) ⇌ PCl₃(g) + Cl₂(g), is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
 - Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
 - Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
 - The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
 - One of the following is not Bronsted-Lowry acid:-
 A. BF₃ B. HCN C. H₂SO₄ D. NH₄⁺
 - This reaction: Ba(OH)₂(aq)+H₂SO₄(aq) → , goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
 - This reaction: 2NO+2H₂ → N₂+2H₂O , is occur in two steps, the reaction for step one is:
 2NO+ H₂ → N₂+ H₂O₂, which of the following is the reaction of step two?
 A. NO+ H₂O₂ → NO₃+ H₂ B. H₂+ H₂O₂ → 2H₂O
 C. NO+ H₂O → H₂+ NO₂ D. None of them
 - In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. C(s)+ O₂(g) ⇌ CO₂(g) B. CaCO₃(s) ⇌ CaO(s) +CO₂(g)
 C. 2H₂(g) + O₂(g) ⇌ 2H₂O (g) D. N₂(g)+3H₂(g) ⇌ 2NH₃(g)
 - Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH₃ B. NaHCO₃ C. NaOH D. both (A and C)

- In the following equilibrium hypothetical gaseous reaction: A+3B ⇌ 2C +energy, the value of equilibrium constant(K) at 300°C is 0.5 , the value of (K) at 200°C for this reaction: 2C+ energy ⇌ A+3B , is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
- An ion that doesn't hydrolyze:-
 A. NO₂⁻ B. CH₃COO⁻ C. ClO₄⁻ D. NH₄⁺
- How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol)
 A. 3.42 B. 1.71 C. 17.1 D. 34.2
- Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
- The rate of this reaction: Zn(s) + 2HCl(aq) → ZnCl₂(aq)+ H₂(g), is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH₃ D. HF
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- Which of the following statements is **not** suitable for this reaction:
 HF(aq)+ HPO₄²⁻ (aq) → F⁻ (aq)+H₂PO₄⁻(aq)?
 A. HF is the acid B. HPO₄²⁻ is the base C. F⁻ is the conjugate base D. H₂PO₄⁻ is the conjugate base
- Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
- Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and [H₃O⁺] B. decreasing ionization of acid and increasing [H₃O⁺]
 C. increasing both ionization of acid and [H₃O⁺] D. increasing ionization of acid and decreasing [H₃O⁺]
- The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
- In this reaction: 2C_(graphite) + 2O₂(g) → 2CO₂(g)+787kJ , which of the following is correct?
 A. ΔH⁰_c of graphite = -393.5 kJ/mol B. ΔH⁰ = ΔH⁰_f of CO₂
 C. ΔH⁰ = ΔH⁰_c of graphite D. All of them are correct
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO₄ B. Mg₃(PO₄)₂ C. Mg₃PO₄ D. KCl
- The [OH⁻] of pure water at specified temperature is equal to 2.3x10⁻⁷M, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0x10⁻¹⁴ B. 3.0x10⁻¹⁵ C. 5.3x10⁻¹⁴ D. 2.3x10⁻⁷

- 26.** Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
- 27.** Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
- 28.** The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- 29.** If 3.5kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron= $0.449J/(g.K)$)
 A. 570 B. 470 C. 277 D. 550
- 30.** In the following reaction: $H_2O(g)+CO(g) \rightleftharpoons H_2(g)+CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
- 31.** The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} mol/L$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- 32.** In this hypothetical reaction: $A+B \rightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
 C. 4 D. 9
- 33.** The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- 34.** In a reaction, $\Delta G^0 = -4.7 kJ/mol$ and $\Delta H^0 = -57.2 kJ/mol$, then the value of ΔS^0 at room temperature is equal to:-
 A. $-0.176J/(mol.K)$ B. $-0.176kJ/(mol.K)$ C. $+0.176kJ/(mol.K)$ D. $-2.1kJ/(mol.K)$
- 35.** In which of the following an aqueous solution acids the $[acid] > [H_3O^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- 36.** Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- 37.** A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH
- 38.** In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)

- 39.** The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ (CH_2=C-CH=CH-CH_3) \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
- 40.** This reaction: (ethanoic acid + methanol $\rightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- 41.** When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[H_3O^+] = [OH^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- 42.** Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. $NaNO_3$ B. $CaCl_2$ C. KCl D. NH_4NO_3
- 43.** The simplest ester is:-
 A. HCOOH B. $HCOOCH_3$ C. CH_3COOH D. CH_3COOCH_3
- 44.** In this reaction: $Mg(s)+H_2SO_4(aq) \rightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- 45.** If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
- 46.** Which of the following reaction is always spontaneous?
 A. $C_2H_4(g)+H_2(g) \rightarrow C_2H_6(g)+\text{energy}$ B. $NH_4Cl(s) \rightarrow NH_3(g)+HCl(g)$ $\Delta H > 0$
 C. $1/2N_2(g)+O_2(g)+33.2kJ \rightarrow NO_2(g)$ D. none of them
- 47.** In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
- 48.** In the adjacent energy diagram if the energy of a reactant is 20kJ/mol, then the energy of product equal to:-
 A. -60kJ/mol B. -40 kJ/mol
 C. 80 kJ/mol D. -120 kJ/mol



- 49.** The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- 50.** The product of complete combustion of one mole of simplest alkyne is:-
 A. $2CO_2+H_2O$ B. CO_2+2H_2O C. $2CO_2+2H_2O$ D. $4CO_2+5H_2O$



2nd Attempt

Time: 3.30 hours

Subject: Chemistry

fingerprint

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Answer the following questions: (two marks for each correct choice)

- Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)
- The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
- This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
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- How many grams of $\text{Ba}(\text{OH})_2$ must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2
- Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \quad \Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them
- Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
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- The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7}\text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

14. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane

15. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

16. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

17. The compound Freon-11 is called:-

- A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

18. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?

- A. ΔH°_c of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_f$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_c$ of graphite D. All of them are correct

19. The value of specific rate constant of reaction increases by:-

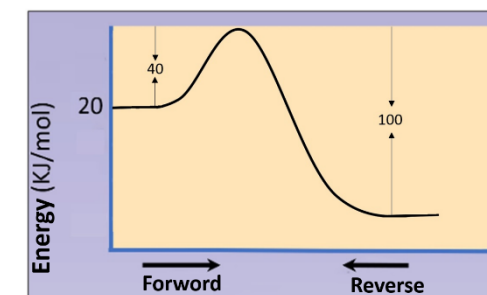
- A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct

20. One of the following is not Bronsted-Lowry acid:-

- A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

21. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol , then the energy of product equal to:-

- A. -60kJ/mol
 B. -40 kJ/mol
 C. 80 kJ/mol
 D. -120 kJ/mol



22. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

23. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-

- A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}

24. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

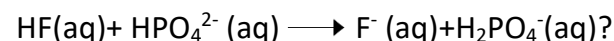
25. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula B. general formula C. molar mass D. boiling point

26. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= $0.449\text{J}/(\text{g}\cdot\text{K})$)

- A. 570 B. 470 C. 277 D. 550

27. Which of the following statements is **not suitable** for this reaction:



- A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base

28. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)

- A. pH= 0.3 B. pH= 0 C. pOH= 14 D. both (B and C)

29. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them

30. In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$, over time and before equilibrium attained:-

- A. the rate of both forward and reverse reaction are increased
B. the rate of its forward and its reverse reaction are equal
C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

31. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-

- A. is equal to the acid solution volume B. is equal to half the acid solution volume
C. is equal to double the acid solution volume D. cannot be determined

32. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?

- A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
C. 0.6 moles of ions is formed D. all of them are correct

33. The correct name for this compound: $\begin{array}{c} \text{CH}_3 \\ | \\ (\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3) \end{array}$ according to IUPAC system is:

- A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

34. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

35. In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor

does the rate increase if the concentration of each A and B is doubled?

- A. 2 B. 8
C. 4 D. 9

Experiment	[A]	[B]	Rate (M/s)
1	0.1	0.1	1×10^{-6}
2	0.2	0.1	4×10^{-6}
3	0.2	0.4	4×10^{-6}

36. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change B. reverse activation energy
C. energy level of reactant D. both (A and C)

37. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute B. concentration of solvent particles
C. nature of solvent D. concentration of solute particles

38. In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4\text{(aq)} \longrightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)

39. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric B. has little tendency to attract a proton
C. is Bronsted-Lowry base D. is Arrhenius base

40. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$, is equal to:

- A. 25 B. 0.04 C. 0.4 D. 2.5

41. Which of the following hydrocarbons is at liquid state?

- A. methane B. propane C. 2-methylbutane D. none of them

42. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

43. The product of complete combustion of one mole of simplest alkyne is:-

- A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

44. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid B. phenol
C. ether D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

45. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?

- A. $\text{C(s)} + \text{O}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(g)}$ B. $\text{CaCO}_3\text{(s)} \rightleftharpoons \text{CaO(s)} + \text{CO}_2\text{(g)}$
C. $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{H}_2\text{O(g)}$ D. $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$

46. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

47. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?

- A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them

48. The simplest ester is:-

- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

49. In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-

- A. $-0.176 \text{ J}/(\text{mol.K})$ B. $-0.176 \text{ kJ}/(\text{mol.K})$ C. $+0.176 \text{ kJ}/(\text{mol.K})$ D. $-2.1 \text{ kJ}/(\text{mol.K})$

50. The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-

- A. increasing pressure B. increasing HCl concentration
C. increasing surface area of Zn D. both (B and C)



2nd Attempt

Time: 3.30 hours

Subject: Chemistry

fingerprint

X

Answer the following questions: (two marks for each correct choice)

- This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is:
 $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
- If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
 A. enthalpy change B. reverse activation energy
 C. energy level of reactant D. both (A and C)
- One of the following is not Bronsted-Lowry acid:-
 A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+
- The boiling-point elevation is colligative property it depends on the:-
 A. nature of solute B. concentration of solvent particles
 C. nature of solvent D. concentration of solute particles
- In this reaction: $\text{Mg(s)} + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{M}$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
- Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
- When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
 A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl
- The Teflon is a sample of addition polymer, its monomer is:-
 A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE
- Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- An ion that doesn't hydrolyze:-
 A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+
- The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
- The product of complete combustion of one mole of simplest alkyne is:-
 A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$

- How many grams of Ba(OH)_2 must be dissolved in 200mL of water to make a solution with pH 13?
 (molar mass=171g/mol) A. 3.42 B. 1.71 C. 17.1 D. 34.2

- Which of the following reaction is always spontaneous?
 A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl(s)} \longrightarrow \text{NH}_3(\text{g}) + \text{HCl(g)}$ $\Delta H > 0$
 C. $1/2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2\text{kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them

- In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-
 A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)

- Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

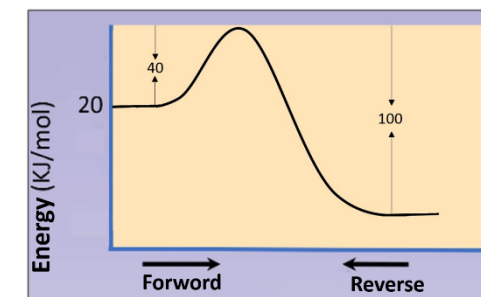
- Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C/m})$	-7.40	-1.79	-3.9	-39.7

- acetic acid B. phenol
C. ether D. camphor
- The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} \text{ mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
- The simplest ester is:-
 A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$
- When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
- The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
- The anion of methanoic acid in its aqueous solution:-
 A. is amphoteric B. has little tendency to attract a proton
 C. is Bronsted-Lowry base D. is Arrhenius base
- In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3
- In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
- A molecule forms ion by the action of solvent:-
 A. KF B. F_2 C. HF D. CH_3OH

28. Which of the following organic compounds pairs is **not** a structural isomer to each other?
 A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
 C. pentane and cyclopentane D. pentane and 2-methyl butane
29. Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)
30. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
31. The value of pH for carbonated beverages:-
 A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined
32. Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
33. Which of the following is a general formula for secondary amine?
 A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them
34. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
 C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$
35. The correct name for this compound: $\begin{matrix} \text{CH}_3 \\ | \\ (\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3) \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
36. If 3.5kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= $0.449\text{J}/(\text{g}\cdot\text{K})$)
 A. 570 B. 470 C. 277 D. 550
37. Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
38. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787\text{kJ}$, which of the following is correct?
 A. ΔH°_c of graphite = -393.5 kJ/mol B. $\Delta H^\circ = \Delta H^\circ_f$ of CO_2
 C. $\Delta H^\circ = \Delta H^\circ_c$ of graphite D. All of them are correct
39. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ B. $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 C. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$ D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
40. The compound Freon-11 is called:-
 A. trichlorofluoromethane B. dichlorodifluoromethane
 C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane
41. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination

42. In the adjacent energy diagram if the energy of a reactant is 20kJ/mol , then the energy of product equal to:-



- A. -60kJ/mol
 B. -40 kJ/mol
 C. 80 kJ/mol
 D. -120 kJ/mol
43. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-
 A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined
44. This reaction: $\text{Ba}(\text{OH})_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:
 A. formation of a gas B. formation of a slightly ionized product
 C. formation of precipitate D. Both (B and C)
45. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
46. In the following reaction: $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
47. The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
48. In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. $\text{pH} = 0.3$ B. $\text{pH} = 0$ C. $\text{pOH} = 14$ D. both (B and C)
49. In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
 C. 4 D. 9
50. Which of the following statements is **not suitable** for this reaction:
 $\text{HF}(\text{aq}) + \text{HPO}_4^{2-}(\text{aq}) \longrightarrow \text{F}^-(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base



2nd Attempt

Time: 3.30 hours

fingerprint

Y

Answer the following questions: (two marks for each correct choice)

1. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

Solvent	Phenol	Ether	Acetic acid	Camphor
$K_f(^{\circ}\text{C}/m)$	-7.40	-1.79	-3.9	-39.7

- A. acetic acid B. phenol
C. ether D. camphor
2. This reaction: $2\text{NO} + 2\text{H}_2 \longrightarrow \text{N}_2 + 2\text{H}_2\text{O}$, is occur in two steps, the reaction for step one is: $2\text{NO} + \text{H}_2 \longrightarrow \text{N}_2 + \text{H}_2\text{O}_2$, which of the following is the reaction of step two?
 A. $\text{NO} + \text{H}_2\text{O}_2 \longrightarrow \text{NO}_3 + \text{H}_2$ B. $\text{H}_2 + \text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 C. $\text{NO} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{NO}_2$ D. None of them
3. Is a chemical compound that is useful for all types of general cleaning and that ionized:-
 A. NH_3 B. NaHCO_3 C. NaOH D. both (A and C)
4. The product of complete combustion of one mole of simplest alkyne is:-
 A. $2\text{CO}_2 + \text{H}_2\text{O}$ B. $\text{CO}_2 + 2\text{H}_2\text{O}$ C. $2\text{CO}_2 + 2\text{H}_2\text{O}$ D. $4\text{CO}_2 + 5\text{H}_2\text{O}$
5. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
 A. HCl B. KOH C. NH_3 D. HF
6. In this hypothetical reaction: $\text{A} + \text{B} \longrightarrow \text{C}$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
C. 4 D. 9
7. When 0.3 moles of potassium nitrate (KNO_3) dissolves in water, which of the following is correct?
 A. the entropy of the system increases B. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 C. 0.6 moles of ions is formed D. all of them are correct
8. The rate of this reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \longrightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$, is increased by:-
 A. increasing pressure B. increasing HCl concentration
 C. increasing surface area of Zn D. both (B and C)
9. In the following reaction: $\text{H}_2\text{O(g)} + \text{CO(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased
10. Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them

11. An equilibrium mixture at 25°C is found to consist of $6.4 \times 10^{-3}\text{M}$ PCl_3 , $2.5 \times 10^{-2}\text{M}$ Cl_2 and $4.0 \times 10^{-3}\text{M}$ PCl_5 , then equilibrium constant for this reaction: $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
12. The boiling-point elevation is colligative property it depends on the:-
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 C. nature of solvent D. concentration of solute particles
13. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-
 A. molecular formula B. general formula C. molar mass D. boiling point
14. In which of the following an aqueous solution acids the $[\text{acid}] > [\text{H}_3\text{O}^+]$?
 A. HNO_3 B. CH_3COOH C. H_2SO_4 D. All of them
15. In which of the following reactions the value of equilibrium constant (K) is equal to product concentration?
 A. $\text{C(s)} + \text{O}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(g)}$ B. $\text{CaCO}_3\text{(s)} \rightleftharpoons \text{CaO(s)} + \text{CO}_2\text{(g)}$
 C. $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{H}_2\text{O(g)}$ D. $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$
16. The solubility of PbCl_2 in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2}\text{mol/L}$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
17. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
18. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?
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 C. energy level of reactant D. both (A and C)
19. Which of the following hydrocarbons is at liquid state?
 A. methane B. propane C. 2-methylbutane D. none of them
20. Which of the following statements is **not suitable** for this reaction:
 $\text{HF(aq)} + \text{HPO}_4^{2-}\text{(aq)} \longrightarrow \text{F}^-\text{(aq)} + \text{H}_2\text{PO}_4^-\text{(aq)}$
 A. HF is the acid B. HPO_4^{2-} is the base C. F^- is the conjugate base D. H_2PO_4^- is the conjugate base
21. The correct name for this compound: CH_3
 $(\text{CH}_2=\text{C}-\text{CH}=\text{CH}-\text{CH}_3)$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene
22. Which of the following is correct?
 A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
 B. an enthalpy of formation is used to compare heat absorption capacities for different material.
 C. the entropy of a pure crystalline solid is zero at all temperature. D. All of them
23. The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct

24. The compound Freon-11 is called:-

- A. trichlorofluoromethane B. dichlorodifluoromethane
C. chlorotrifluoromethane D. 3-chloro-1-fluoromethane

25. In a reaction, $\Delta G^0 = -4.7 \text{ kJ/mol}$ and $\Delta H^0 = -57.2 \text{ kJ/mol}$, then the value of ΔS^0 at room temperature is equal to:-

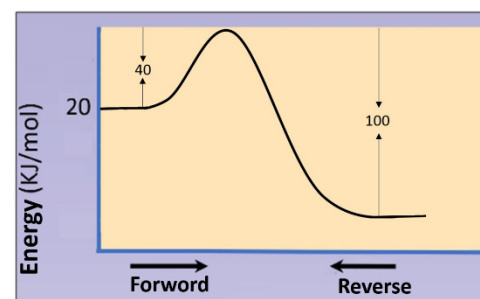
- A. -0.176 J/(mol.K) B. $-0.176 \text{ kJ/(mol.K)}$ C. $+0.176 \text{ kJ/(mol.K)}$ D. -2.1 kJ/(mol.K)

26. The Teflon is a sample of addition polymer, its monomer is:-

- A. C_2F_2 B. CFCs C. C_2F_4 D. MTBE

27. In the adjacent energy diagram if the energy of a reactant is 20 kJ/mol , then the energy of product equal to:-

- A. -60 kJ/mol
B. -40 kJ/mol
C. 80 kJ/mol
D. -120 kJ/mol



28. How many grams of Ba(OH)_2 must be dissolved in 200 mL of water to make a solution with pH 13? (molar mass= 171 g/mol)

- A. 3.42 B. 1.71 C. 17.1 D. 34.2

29. This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-

- A. condensation B. addition C. substitution D. elimination

30. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric B. has little tendency to attract a proton
C. is Bronsted-Lowry base D. is Arrhenius base

31. Spreading the same mole of which of the following salts to icy roads more influential to melt ice?

- A. NaNO_3 B. CaCl_2 C. KCl D. NH_4NO_3

32. In the 0.5 M H_2SO_4 solution:- (suppose it ionized completely)

- A. $\text{pH} = 0.3$ B. $\text{pH} = 0$ C. $\text{pOH} = 14$ D. both (B and C)

33. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane B. hexene and cyclohexane
C. pentane and cyclopentane D. pentane and 2-methyl butane

34. An ion that doesn't hydrolyze:-

- A. NO_2^- B. CH_3COO^- C. ClO_4^- D. NH_4^+

35. Which of the following is a general formula for secondary amine?

- A. $(\text{R}_2\text{N}-\text{H}^+)$ B. $(\text{R}-\text{NH}_2)$ C. $(\text{R}-\text{NH}-\text{R}')$ D. None of them

36. Which of the following reaction is always spontaneous?

- A. $\text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g}) \longrightarrow \text{C}_2\text{H}_6(\text{g}) + \text{energy}$ B. $\text{NH}_4\text{Cl}(\text{s}) \longrightarrow \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$ $\Delta H > 0$
C. $1/2 \text{ N}_2(\text{g}) + \text{O}_2(\text{g}) + 33.2 \text{ kJ} \longrightarrow \text{NO}_2(\text{g})$ D. none of them

37. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?

- A. MgPO_4 B. $\text{Mg}_3(\text{PO}_4)_2$ C. Mg_3PO_4 D. KCl

38. In the reaction ammonium ions with water molecule which of the following is not produced?

- A. NH_3 B. OH^- C. H_3O^+ D. None of them

39. If 3.5 kJ of energy are added to a 28.1 g sample of iron at 20°C , what is the final temperature of the iron in kelvins? (if the specific heat of iron= 0.449 J/(g.K))

- A. 570 B. 470 C. 277 D. 550

40. In this reaction: $2\text{C}_{(\text{graphite})} + 2\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 787 \text{ kJ}$, which of the following is correct?

- A. ΔH^0_c of graphite = -393.5 kJ/mol B. $\Delta H^0 = \Delta H^0_f$ of CO_2
C. $\Delta H^0 = \Delta H^0_c$ of graphite D. All of them are correct

41. One of the following is not Bronsted-Lowry acid:-

- A. BF_3 B. HCN C. H_2SO_4 D. NH_4^+

42. The $[\text{OH}^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} \text{ M}$, then the value of ionization constant of water at the same temperature is equal to:

- A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}

43. In the following equilibrium hypothetical gaseous reaction: $\text{A} + 3\text{B} \rightleftharpoons 2\text{C} + \text{energy}$, the value of equilibrium constant (K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2\text{C} + \text{energy} \rightleftharpoons \text{A} + 3\text{B}$, is:-

- A. less than 2 B. greater than 2 C. equal 2 D. cannot be determined

44. This reaction: $\text{Ba(OH)}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, goes to completion because:

- A. formation of a gas B. formation of a slightly ionized product
C. formation of precipitate D. Both (B and C)

45. Adding a small amount of KCN to HCN solution leads to:-

- A. decreasing both ionization of acid and $[\text{H}_3\text{O}^+]$ B. decreasing ionization of acid and increasing $[\text{H}_3\text{O}^+]$
C. increasing both ionization of acid and $[\text{H}_3\text{O}^+]$ D. increasing ionization of acid and decreasing $[\text{H}_3\text{O}^+]$

46. The simplest ester is:-

- A. HCOOH B. HCOOCH_3 C. CH_3COOH D. $\text{CH}_3\text{COOCH}_3$

47. A molecule forms ion by the action of solvent:-

- A. KF B. F_2 C. HF D. CH_3OH

48. Which of the following organic compounds that are often responsible for odors and flavors?

- A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them

49. The value of pH for carbonated beverages:-

- A. is equal to 7 B. less than 7 C. greater than 7 D. cannot be determined

50. In this reaction: $\text{Mg}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow$, which of the following is spectator ion?

- A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)



2nd Attempt

Subject: Chemistry

Time: 3.30 hours

fingerprint

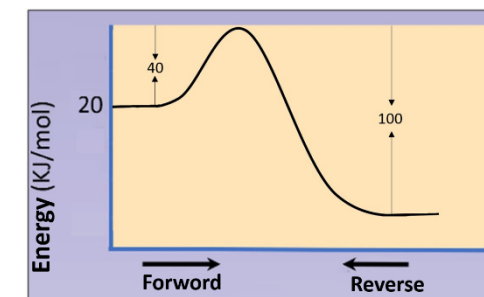
Z

Answer the following questions: (two marks for each correct choice)

- Which of the following may be saturated hydrocarbon?
 A. C_3H_6 B. C_5H_8 C. C_7H_8 D. none of them
- Spreading the same mole of which of the following salts to icy roads more influential to melt ice?
 A. $NaNO_3$ B. $CaCl_2$ C. KCl D. NH_4NO_3
- The simplest ester is:-
 A. $HCOOH$ B. $HCOOCH_3$ C. CH_3COOH D. CH_3COOCH_3
- Which of the following is a general formula for secondary amine?
 A. (R_2N-H^+) B. $(R-NH_2)$ C. $(R-NH-R')$ D. None of them
- The value of specific rate constant of reaction increases by:-
 A. using catalyst B. increasing reactant concentration
 C. increasing temperature D. both (A and C) are correct
- This reaction: (ethanoic acid + methanol $\longrightarrow$ methyl ethanoate + water), is called:-
 A. condensation B. addition C. substitution D. elimination
- This reaction: $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$, is occur in two steps, the reaction for step one is:
 $2NO + H_2 \longrightarrow N_2 + H_2O_2$, which of the following is the reaction of step two?
 A. $NO + H_2O_2 \longrightarrow NO_3 + H_2$ B. $H_2 + H_2O_2 \longrightarrow 2H_2O$
 C. $NO + H_2O \longrightarrow H_2 + NO_2$ D. None of them
- If 3.5kJ of energy are added to a 28.1 g sample of iron at $20^\circ C$, what is the final temperature of the iron in kelvins? (if the specific heat of iron = $0.449 J/(g.K)$)
 A. 570 B. 470 C. 277 D. 550
- In this reaction: $Mg(s) + H_2SO_4(aq) \longrightarrow$, which of the following is spectator ion?
 A. Mg^{2+} B. SO_4^{2-} C. H_3O^+ D. both (A and B)
- In the 0.5M H_2SO_4 solution:- (suppose it ionized completely)
 A. pH = 0.3 B. pH = 0 C. pOH = 14 D. both (B and C)
- In the reaction ammonium ions with water molecule which of the following is not produced?
 A. NH_3 B. OH^- C. H_3O^+ D. None of them
- The correct name for this compound: $\begin{matrix} CH_3 \\ | \\ CH_2 = C - CH = CH - CH_3 \end{matrix}$ according to IUPAC system is:
 A. 4-methyl-2,4-butadiene B. 4-methyl-2,4-pentadiene
 C. 2-methyl-1,3-pentadiene D. 2-methyl-1,3-pentene

13. In the adjacent energy diagram if the energy of a reactant is $20 kJ/mol$, then the energy of product equal to:-

A. $-60 kJ/mol$
 B. $-40 kJ/mol$
 C. $80 kJ/mol$
 D. $-120 kJ/mol$



14. The required volume of 0.4M NaOH to neutralize 200mL of 0.2M H_2SO_4 solution :-
 A. is equal to the acid solution volume B. is equal to half the acid solution volume
 C. is equal to double the acid solution volume D. cannot be determined
15. Adding a small amount of KCN to HCN solution leads to:-
 A. decreasing both ionization of acid and $[H_3O^+]$ B. decreasing ionization of acid and increasing $[H_3O^+]$
 C. increasing both ionization of acid and $[H_3O^+]$ D. increasing ionization of acid and decreasing $[H_3O^+]$
16. An equilibrium mixture at $25^\circ C$ is found to consist of $6.4 \times 10^{-3} M$ PCl_3 , $2.5 \times 10^{-2} M$ Cl_2 and $4.0 \times 10^{-3} M$ PCl_5 , then equilibrium constant for this reaction: $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, is equal to:
 A. 25 B. 0.04 C. 0.4 D. 2.5
17. In a reaction, $\Delta G^0 = -4.7 kJ/mol$ and $\Delta H^0 = -57.2 kJ/mol$, then the value of ΔS^0 at room temperature is equal to:-
 A. $-0.176 J/(mol.K)$ B. $-0.176 kJ/(mol.K)$ C. $+0.176 kJ/(mol.K)$ D. $-2.1 kJ/(mol.K)$
18. The $[OH^-]$ of pure water at specified temperature is equal to $2.3 \times 10^{-7} M$, then the value of ionization constant of water at the same temperature is equal to:
 A. 1.0×10^{-14} B. 3.0×10^{-15} C. 5.3×10^{-14} D. 2.3×10^{-7}
19. Which of the following organic compounds that are often responsible for odors and flavors?
 A. aldehyde and ketone B. carboxylic acid and ester C. amines D. All of them
20. In which of the following reactions the value of equilibrium constant(K) is equal to product concentration?
 A. $C(s) + O_2(g) \rightleftharpoons CO_2(g)$ B. $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
 C. $2H_2(g) + O_2(g) \rightleftharpoons 2H_2O(g)$ D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
21. The solubility of $PbCl_2$ in its saturated solution at specified temperature is equal to $1.6 \times 10^{-2} mol/L$, then the value of K_{sp} is:-
 A. 2.5×10^{-4} B. 5.1×10^{-4} C. 1.6×10^{-5} D. 4.1×10^{-6}
22. In this hypothetical reaction: $A + B \longrightarrow C$, by using the information in the adjacent table, by what factor does the rate increase if the concentration of each A and B is doubled?
- | Experiment | [A] | [B] | Rate (M/s) |
|------------|-----|-----|--------------------|
| 1 | 0.1 | 0.1 | 1×10^{-6} |
| 2 | 0.2 | 0.1 | 4×10^{-6} |
| 3 | 0.2 | 0.4 | 4×10^{-6} |
- A. 2 B. 8
 C. 4 D. 9
23. In the following reaction: $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, over time and before equilibrium attained:-
 A. the rate of both forward and reverse reaction are increased
 B. the rate of its forward and its reverse reaction are equal
 C. the rate of forward reaction is increased and the rate of reverse reaction is decreased
 D. the rate of forward reaction is decreased and the rate of reverse reaction is increased

24. The boiling-point elevation is colligative property it depends on the:-

- A. nature of solute
B. concentration of solvent particles
C. nature of solvent
D. concentration of solute particles

25. A molecule forms ion by the action of solvent:-

- A. KF
B. F₂
C. HF
D. CH₃OH

26. When combined an aqueous solution of magnesium chloride and potassium phosphate, which of the following is precipitate?
A. MgPO₄
B. Mg₃(PO₄)₂
C. Mg₃PO₄
D. KCl

27. The compound Freon-11 is called:-

- A. trichlorofluoromethane
B. dichlorodifluoromethane
C. chlorotrifluoromethane
D. 3-chloro-1-fluoromethane

28. The Teflon is a sample of addition polymer, its monomer is:-

- A. C₂F₂
B. CFCs
C. C₂F₄
D. MTBE

29. The value of pH for carbonated beverages:-

- A. is equal to 7
B. less than 7
C. greater than 7
D. cannot be determined

30. Which of the following hydrocarbons is at liquid state?

- A. methane
B. propane
C. 2-methylbutane
D. none of them

31. In this reaction: $2C_{(graphite)} + 2O_2(g) \longrightarrow 2CO_2(g) + 787kJ$, which of the following is correct?

- A. ΔH^0_c of graphite = -393.5 kJ/mol
B. $\Delta H^0 = \Delta H^0_f$ of CO₂
C. $\Delta H^0 = \Delta H^0_c$ of graphite
D. All of them are correct

32. Which of the following organic compounds pairs is **not** a structural isomer to each other?

- A. pentane and 2,2-di methyl propane
B. hexene and cyclohexane
C. pentane and cyclopentane
D. pentane and 2-methyl butane

33. How many grams of Ba(OH)₂ must be dissolved in 200mL of water to make a solution with pH 13? (molar mass=171g/mol)
A. 3.42
B. 1.71
C. 17.1
D. 34.2

34. One of the following is not Bronsted-Lowry acid:-

- A. BF₃
B. HCN
C. H₂SO₄
D. NH₄⁺

35. In the following equilibrium hypothetical gaseous reaction: $A + 3B \rightleftharpoons 2C + \text{energy}$, the value of equilibrium constant(K) at 300°C is 0.5, the value of (K) at 200°C for this reaction: $2C + \text{energy} \rightleftharpoons A + 3B$, is:-
A. less than 2
B. greater than 2
C. equal 2
D. cannot be determined

36. Which of the following is correct?

- A. as the kinetic energy of the particles is greater in a sample, its temperature is higher.
B. an enthalpy of formation is used to compare heat absorption capacities for different material.
C. the entropy of a pure crystalline solid is zero at all temperature.
D. All of them

37. Butane and 2-methyl propane are similar in all of the following **EXCEPT**:-

- A. molecular formula
B. general formula
C. molar mass
D. boiling point

38. When 0.3 moles of potassium nitrate (KNO₃) dissolves in water, which of the following is correct?

- A. the entropy of the system increases
B. [H₃O⁺]=[OH⁻]
C. 0.6 moles of ions is formed
D. all of them are correct

39. An ion that doesn't hydrolyze:-

- A. NO₂⁻
B. CH₃COO⁻
C. ClO₄⁻
D. NH₄⁺

40. Two moles of a nonelectrolyte solute are dissolved in 1kg of an unknown solvent, the solution freezes at 7.8°C below its normal freezing point, which of the following is the unknown solvent? (use the information in the adjacent table)

- A. acetic acid
B. phenol
C. ether
D. camphor

Solvent	Phenol	Ether	Acetic acid	Camphor
K _f (°C/m)	-7.40	-1.79	-3.9	-39.7

41. The product of complete combustion of one mole of simplest alkyne is:-

- A. 2CO₂+H₂O
B. CO₂+2H₂O
C. 2CO₂+2H₂O
D. 4CO₂+5H₂O

42. Which of the following reaction is always spontaneous?

- A. C₂H₄(g)+ H₂(g) $\longrightarrow$ C₂H₆(g)+ energy
B. NH₄Cl(s) $\longrightarrow$ NH₃(g)+ HCl(g) $\Delta H > 0$
C. 1/2N₂(g)+ O₂(g) +33.2kJ $\longrightarrow$ NO₂(g)
D. none of them

43. This reaction: Ba(OH)₂(aq)+H₂SO₄(aq) $\longrightarrow$, goes to completion because:

- A. formation of a gas
B. formation of a slightly ionized product
C. formation of precipitate
D. Both (B and C)

44. If the use of catalyst in a chemical reaction leads to decrease forward activation energy by amount 10kJ/mol, which of the following is decreased with the same amount?

- A. enthalpy change
B. reverse activation energy
C. energy level of reactant
D. both (A and C)

45. In which of the following an aqueous solution acids the [acid]>[H₃O⁺]?

- A. HNO₃
B. CH₃COOH
C. H₂SO₄
D. All of them

46. Which of the following statements is **not suitable** for this reaction:



- A. HF is the acid
B. HPO₄²⁻ is the base
C. F⁻ is the conjugate base
D. H₂PO₄⁻ is the conjugate base

47. The anion of methanoic acid in its aqueous solution:-

- A. is amphoteric
B. has little tendency to attract a proton
C. is Bronsted-Lowry base
D. is Arrhenius base

48. Is a chemical compound that is useful for all types of general cleaning and that ionized:-

- A. NH₃
B. NaHCO₃
C. NaOH
D. both (A and C)

49. Which of the following solutions with 0.1M concentration contains the lowest concentration of hydroxide ions?
A. HCl
B. KOH
C. NH₃
D. HF

50. The rate of this reaction: Zn(s) + 2HCl(aq) $\longrightarrow$ ZnCl₂(aq)+ H₂(g), is increased by:-

- A. increasing pressure
B. increasing HCl concentration
C. increasing surface area of Zn
D. both (B and C)