38. The solubility of $Mg(OH)_2$ ($K_{sp} = 1.8 \times 10^{-11}$) in a buffer solution having pH = 10 is:
A) 0.18 M B) 0.018 M C) $1.8x10^{-3}$ M D) $1.8x10^{-4}$ M

39. A solution of 0.5 g of urea (M. Wt. of urea = 60 g/mol) in 25 g of water gave a boiling point elevation of 0.2°C, the molal elevation constant of water (ΔT_b) equals:
A) 0.45 M B) 0.50 M C) 0.55 M D) 0.60

40. The pH of 0.66 M of an aqueous H_2SO_4 solution is:
A) 2.81 B) 2.18 C) 1.18 D) 0.18

41. Le Châtelier principle is not applicable to:
A) $H_{2(g)} + I_{2(g)} \leftrightharpoons 2HI_{(g)}$ B) $Fe_{(s)} + S_{(s)} \leftrightharpoons FeS_{(s)}$
C) $N_{2(g)} + 3H_{2(g)} \leftrightharpoons 2\ NH_{3(g)}$ D) $N_{2(g)} + O_{2(g)} \leftrightharpoons 2\ NO_{(g)}$

42. The molar solubility of Ag_2SO_4 in 1M aqueous Na_2SO_4 solution equals: ($K_{sp} = 1.4x10^{-5}$)
A) 0.058 M B) 0.0058 M C) $1.87x10^{-3}$ M D) $1.85x10^{-4}$ M

43. For the following system: $PCl_{5(g)} \leftrightharpoons PCl_{3(g)} + Cl_{2(g)}$ $K_c = 0.04$ at 450 °C. K_p for this reaction at the same temperature equals: ($R = 0.082$ L atm mol^{-1} K^{-1})
A) 0.67 B) 1.64 C) 2.37 D) 6.7×10^{-4}

44. The pH of a solution containing 0.2 M of both NH_4OH and NH_4Cl is:
(K_b for $NH_4OH = 1.8 \times 10^{-5}$)
A) 7.47 B) 4.74 C) 9.26 D) 10.79

45. The freezing point of sucrose solution that has 34.23 gm sucrose per 100 gm H_2O is:
(M. Wt. of sucrose = 342.3 and $K_f = 1.8$ °C /mol)
A) 1.8 B) -1.8 C) -1.36 D) -1.63

46. In which of the following aqueous solutions will the molar solubility of $Al(OH)_3$ ($K_{sp} = 1.3x10^{-33}$) be greatest? (K_b of $NH_4OH = 1.8x10^{-5}$)
A) 1M NH_4OH. B) 1M NH_4OH - 1M NH_4Cl C) 1M NH_4Cl D) 1M NaCl

47. The equilibrium constant (Keq) for a certain reaction will change if ..... changes.
A) Pressure B) Concentration C) Volume D) Temperature

48. The freezing point depression ΔT_f in dilute solution is directly proportional to the ..... concentration of the solute.
A) molar B) molal C) normal D) gm/L

49. Consider the following reaction and determine which of the condition will shift the equilibrium position to the right? $4NH_{3(g)} + 5\ O_{2(g)} \leftrightharpoons 4NO_{(g)} + 6H_2O_{(g)}$ + Heat
A) Increasing the temperature B) Increasing NO concentration
C) Increasing the volume D) None of the above is correct

50. If the concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is 2×10^{-4} M, the K_{sp} of $Ag_2C_2O_4$ will be:
A) 5.3×10^{-12} B) 4.5×10^{-12} C) 4×10^{-12} D) None of these

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Prof. Ahmed Abdou Omar & Dr. Soliman Abdel Fadeel

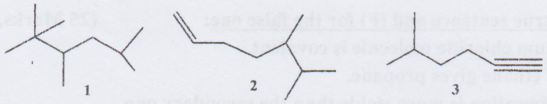
Q2: Choose the correct answer A, B, C, or D: (25 Marks, one Mark for each)

The reaction: $CH_4 \xrightarrow[UV]{Cl_2}$ Mixture

26. The reaction is: A) Nucleophilic substitution. B) Electrophilic substitution. C) Free Radical. D) None.

27. The mixture contains: A) Ethane B) Propane C) Methyl chloride D) None of these.

28. Methane can react with H_2SO_4 to give: A. Ethane. B. Alcohol C. Does not react D. Methyl group.



29. The IUPAC name of Compound 1:

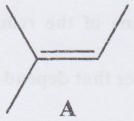
A) 2,4,5,5-Tetramethyl hexane. B) 2,2,3,5-Tetramethyl hexane.

C) 2,2,3,5-Tetramethyl heptane D) 2,4,5,5-Tetramethyl heptane.

30. The IUPAC name of Compound 2: A) 5,6-Dimethyl-1-heptene. B) 5,6-Dimethyl heptene.
C) 2,3-Dimethyl-6-heptene. D) 2,3-Dimethyl heptene.

31. The IUPAC name of Compound 3: A) 2-Methyl-5-hexene. B) 2-Methyl-5-hexyne.
C) 5-Methyl-1-hexyne. D) 5-Methyl hexyne.

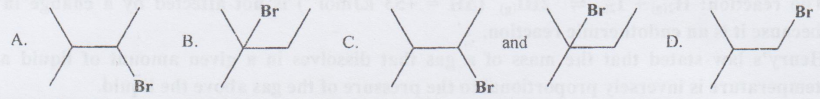
32. Which compound is more reactive: A) Compound 1. B) Compound 2.
C) Compound 3. D) All are reactive.

The reaction:  $\xrightarrow{HBr}$ The product

A

33. Compound A is: A) Symmetrical. B) Unsymmetrical. C) Identical. D) None.

34. The product of the reaction is:



35. This reaction is: A) Substitution. B) Oxidation. C) Reduction. D) Addition.

36. Consider the reaction $2H_{2(g)} + O_{2(g)} \leftrightharpoons 2H_2O_{(g)}$. Which of the following correctly states the expression for the equilibrium constant (K_c) for this reaction?

A) $2[H_2O]/2[H_2][O_2]$ B) $2[H_2][O_2]/2[H_2O]$

C) $[H_2O]^2/[H_2]^2[O_2]$ D) $1/[H_2]^2[O_2]$

37. Which of the following solutions has the highest pH value?

A) 0.1 M HNO_3 B) 0.1 M CH_3COOH (K_a of $CH_3COOH = 1.8 \times 10^{-5}$)

C) 0.1 M $NaNO_3$ D) 0.1 M CH_3COONa

Assiut University
Faculty of Science
Chemistry Department

3 Sept. 2025
Time: 2 hours

Final Examination of General Chemistry II (105 C)

Answer the following questions: (50 Marks)

Q1: Put (T) for the true sentence and (F) for the false one: (25 Marks, one Mark for each)

1. The bond in sodium chloride molecule is covalent.
2. The reduction of ethane gives propane.
3. The primary carbocation is more stable than the secondary one.
4. The reduction of 2-butene gives 2-butane.
5. The electrophiles are electron lovers, which are electron poor reagent.
6. Alkene is a hydrocarbon that contains one or more carbon-carbon triple bonds.
7. The nucleophiles are electron rich.
8. The compound; $CH_2=CH_2$ is named ethene or ethylene.
9. Pentadiene is compound of alkene contain one double bond.
10. Addition of water to ethene gives ethanol.
11. The compound; $CH_2=CH_2$ has two identical group cis and trance.
12. Methane reacts with sodium hydroxide to give sodium salt of methane.
13. The tertiary carbon is a carbon bonded to three carbons.
14. The butyl group is obtained when hydrogen atom added to butane.
15. Propylene is a symmetrical alkene.
16. For a reaction at equilibrium, removal of one of the reactants will shift the equilibrium in the backward direction.
17. Colligative properties of solutions are properties that depend on the chemical nature of the solute but not on the concentration of solute in solution.
18. The pH of 0.0001 M of an aqueous solution of H_2SO_4 equals 4
19. The solubility of calcium oxalate, CaC_2O_4 , decreases as the pH is lowered.
20. The reaction: $H_{2(g)} + I_{2(g)} \leftrightharpoons 2HI_{(g)}$ ($\Delta H = +53\ kJmol^{-1}$) is not affected by a change in pressure because it is an endothermic reaction.
21. Henry's law stated that the mass of a gas that dissolves in a given amount of liquid at a given temperature is inversely proportional to the pressure of the gas above the liquid.
22. At constant pressure, adding helium gas will shift the following equilibrium:
    $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$, to the forward direction.
23. Large K_{sp} value and low initial ion concentrations favor the completeness of precipitation.
24. When a non-volatile solute is dissolved in a liquid solvent, the resulting solution has a vapor pressure that is higher than that of the pure solvent at the same temperature.
25. The ionization of a weak base increases in the presence of a common ion from a strong electrolyte.

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