



Choose the correct answer (two marks for each question)

- How many moles of anion are produced by dissolving 0.15 mol of aluminium acetate?
 A. 0.60 mol B. 0.15 mol C. 0.45 mol D. 0.30 mol
- A solution consists of 3.13 g of a nonelectrolyte solute in 38 g of water, the boiling point of the solution is higher than the boiling point of pure water by 1°C, the molar mass of solute is:-
 ($K_b = 0.51^\circ\text{C}/m$) A. 101 g/mol B. 1.96 g/mol C. 42 g/mol D. 237 g/mol
- A compound that ionizes and contains the highest concentration of ions is:-
 A. 0.5 M HCl B. 0.3 M K_3PO_4 C. 0.5 M NH_3 D. 0.3 M H_2SO_4
- Which of the following has the higher vapour-pressure?
 A. 0.3 m sucrose B. 0.1 m glucose C. 0.2 m sucrose D. pure water
- Which of the following pairs of an aqueous solutions produces barium sulfate precipitate when combined?
 A. $\text{Ba}(\text{NO}_3)_2, \text{K}_2\text{SO}_4$ B. $\text{BaCl}_2, \text{Na}_2\text{SO}_4$ C. $\text{BaCl}_2, \text{K}_2\text{S}$ D. both (A and B)
- A volatile, unstable acid when is pure, it is used in making explosives is:-
 A. H_2SO_4 B. HNO_3 C. HNO_2 D. H_3PO_4
- In the reaction NH_3 with Ag^+ ions, ammonia acts as:
 A. Lewis base B. Bronsted-Lowry base C. Arrhenius base D. all of them
- The anion of the salt of a weak acid and strong base:
 A. has a great tendency to donate a proton B. has a great tendency to accept a proton
 C. is a strong conjugate acid D. is a weak conjugate base
- Which of the following is correct for binary acid nomenclature?
 A. the name of a binary acid begins with the prefix hydro-
 B. the root of the name of the second element follows this prefix
 C. the name then ends with the suffix-ic
 D. all of them are correct
- Which of the following chemical equation is incorrect?
 A. $\text{Sr}(\text{OH})_2 + \text{H}_2\text{CO}_3 \rightarrow \text{SrCO}_3 + 2\text{H}_2\text{O}$ B. $4\text{Ba}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{H}_2\text{S} + 4\text{BaO}$
 C. $2\text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} + 2\text{CO}_2$ D. $\text{HClO}_4 + \text{NaOH} \rightarrow \text{NaClO}_4 + \text{H}_2\text{O}$
- The pH of pure water:
 A. it is equal to 7 at all temperatures B. it is equal to 7 at 25°C
 C. less than 7 at 50°C D. both (B and C)
- Which of the following is correct for this indicator: $\text{HIn} \rightleftharpoons \text{H}^+ + \text{In}^-$, in the basic solution:
 A. the ionization of indicator molecules increases B. the concentration of In^- ions decreases
 C. the ionization of indicator molecules decreases D. the equilibrium shifts to the left direction
- If the pH of a solution is 3, then:
 A. $[\text{OH}^-] = 1 \times 10^{-3} \text{M}$, acidic B. $[\text{OH}^-] = 1 \times 10^{-11} \text{M}$, basic
 C. $[\text{OH}^-] = 1 \times 10^{-11} \text{M}$, acidic D. $[\text{H}_3\text{O}^+] = 1 \times 10^{-3} \text{M}$, basic

- In a titration, 26.9 mL of $3.4 \times 10^{-3} \text{M}$ $\text{Ba}(\text{OH})_2$ neutralized 16.6 mL of HCl solution. What is the molarity of acid?
 A. 1.1×10^{-2} B. 5.5×10^{-3} C. 2.75×10^{-3} D. 1.1×10^{-3}
 - This reaction: $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g}) + 114.2 \text{kJ}$, is:
 A. always spontaneous B. spontaneous at low temperatures, but not at high temperatures
 C. is never spontaneous D. spontaneous at high temperatures, but not at low temperatures
 - If 3.563 kJ of energy added to 55 g sample of aluminium, how much temperature in kelvin will rise of the sample? ($C_p = 0.897 \text{J}/(\text{g}\cdot\text{K})$)
 A. 72.2 K B. 4.0 K C. 7.22 K D. 65 K
 - Calculate the standard enthalpy of formation (ΔH_f°) of CH_4 , if the standard enthalpy of combustion for each of H_2 , C and CH_4 is equal (-286, -394, -891) kJ/mol respectively.
 A. -75 kJ/mol B. -713 kJ/mol C. 713 kJ/mol D. 75 kJ/mol
 - In a reaction at 25°C, $\Delta G^\circ = 91 \text{kJ/mol}$, $\Delta S^\circ = 0.2855 \text{kJ}/(\text{mol}\cdot\text{K})$ the value of ΔH° is equal to:-
 A. -176 kJ/mol. B. 98.2 kJ/mol C. 176 kJ/mol D. -98.2 kJ/mol
 - If the standard enthalpy of formation for each of SO_2 , C_2H_2 , HI and CO_2 is equal (-296.8, +226.7, +26.5, -394) kJ/mol respectively, which of the following is more stable?
 A. CO_2 B. C_2H_2 C. HI D. SO_2
 - In a reaction the value of $E_a = 126 \text{kJ/mol}$, $E_a^- = 86 \text{kJ/mol}$ and the product energy level is 40 kJ/mol, then the reactant energy level is equal to:
 A. zero B. 80 kJ/mol C. -40 kJ/mol D. 212 kJ/mol
 - The minimum energy required for an effective collision is:-
 A. free energy B. activation energy C. kinetic energy D. enthalpy of reaction
 - In the following reaction: $\text{A} + 2\text{B} \rightarrow \text{C}$, the overall order of reaction is 3, doubling [B] quadruples the rate of reaction, which of the following is correct?
 A. the reaction is occur in the one-step mechanism B. $R = k[\text{A}]^2[\text{B}]$
 C. $R = k[\text{A}][\text{B}]^2$ D. both (A and C) are correct
 - The following data relate to the reaction: $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$, which of the following is correct?
 A. $R_1 = R_2$ B. $R_1 > R_2$ C. $R_2 > R_1$ D. $R_1 = 2R_2$
- | Experiment | $[\text{H}_2\text{O}_2]$ | Temperature °C | Rate |
|------------|--------------------------|----------------|-------|
| 1 | 0.1 | 10 | R_1 |
| 2 | 0.2 | 20 | R_2 |
- In the following reaction: $2\text{A} \rightarrow \text{C} + \text{E}$, the value of specific rate constant is 0.02s^{-1} , when the rate of reaction is $5 \times 10^{-6} \text{M}\cdot\text{s}^{-1}$, the reactant concentrations is equal to:-
 A. $4 \times 10^{-5} \text{M}$ B. $5 \times 10^{-4} \text{M}$ C. $2.5 \times 10^{-4} \text{M}$ D. $1.58 \times 10^{-2} \text{M}$
 - A chemical reaction is in equilibrium when:
 A. forward and reverse reactions have ceased B. forward and reverse reaction rates are equal
 C. the equilibrium constant equals one (1) D. no reactants remain
 - Which of the following is correct in an aqueous solution of 0.5 M Na_2CO_3 ?
 A. Na^+ ions hydrolyze B. $[\text{H}_3\text{O}^+] > [\text{OH}^-]$ C. $[\text{OH}^-] > [\text{H}_3\text{O}^+]$ D. both (A and C) are correct
 - By adding hydrogen chloride gas to saturated solution of sodium chloride, at new equilibrium:-
 A. $[\text{Cl}^-]$ decreases B. $[\text{Na}^+]$ increases C. $[\text{Na}^+]$ decreases D. both (A and C)

28. The number of moles Hg^{2+} in 1000L of a saturated solution of HgS is: if ($K_{sp}=1.6 \times 10^{-52}$)
 A. 1.26×10^{-23} B. 5.4×10^{-18} C. 1.26×10^{-26} D. 8.0
29. In the following gaseous equilibrium system: $2\text{CO} + \text{O}_2 \rightleftharpoons 2\text{CO}_2 + \text{energy}$, which of the following has no effect on the equilibrium shift?
 A. changes in concentration B. adding catalyst
 C. changes in pressure D. changes in temperature
30. All of the following situations the reactions go to completion **except**:-
 A. formation of a gas in open container B. formation of a precipitate
 C. formation of a slightly ionized product D. formation of a strongly ionized product
31. The oxidation number of carbon in which of the following is -4?
 A. CH_4 B. CO C. CO_2 D. CaCO_3
32. In this reaction: $\text{PbS}(\text{s}) + 4\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$, the atoms of.....are oxidized.
 A. lead B. sulfur C. hydrogen D. oxygen
33. The hydrogen acts as oxidizing agent in the reaction:-
 A. $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ B. $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$
 C. $\text{H}_2 + 2\text{Li} \rightarrow 2\text{LiH}$ D. both (A and B) are correct
34. In this half-reaction: $\text{ClO}_3^- \rightarrow \text{Cl}^-$, Cl:
 A. loses 6 electrons B. gains 6 electrons C. loses 5 electrons D. gains 5 electrons
35. In which of the following the oxidation process has occurred?
 A. $\text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{S} + 4\text{OH}^-$ B. $[\text{Mn}(\text{CN})_6]^{4-} \rightarrow [\text{Mn}(\text{CN})_6]^{3-}$
 C. $2\text{H}^+ + \text{NO}_3^- \rightarrow \text{NO}_2 + \text{H}_2\text{O}$ D. none of them
36. The cathode half- reaction equation in mercury batteries is:
 A. $\text{HgO}(\text{s}) + \text{H}_2\text{O}(\text{l}) + 2\text{e}^- \rightarrow \text{Hg}(\text{l}) + 2\text{OH}^-(\text{aq})$ B. $\text{HgO}(\text{s}) + 2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{Hg}(\text{l}) + \text{H}_2\text{O}(\text{l})$
 C. $\text{Zn}(\text{s}) + 2\text{OH}^-(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{OH})_2(\text{s})$ D. $\text{Zn}(\text{OH})_2 + 2\text{e}^- \rightarrow \text{Zn}(\text{s}) + 2\text{OH}^-(\text{aq})$
37. This reaction: $\text{Mg} + \text{Sn}^{2+} \rightarrow$, will occur spontaneously as written, which of the following is correct?
 A. Mg is more easily oxidized than Sn B. $E^\circ_{\text{reduce}} \text{Mg}^{2+} < E^\circ_{\text{reduce}} \text{Sn}^{2+}$
 C. $E^\circ_{\text{reduce}} \text{Mg}^{2+} > E^\circ_{\text{reduce}} \text{Sn}^{2+}$ D. both (A and B) are correct
38. The..... process is occur at cathode of electroplating cell.
 A. reduction B. oxidation C. precipitation D. reduction and precipitation
39. If a strip of nickel were dipped into a solution of AgNO_3 , what would be expected to occur? if $E^\circ_{\text{reduce}} \text{Ni}^{2+}$, Ag^+ equals (-0.23, +0.80) volt respectively.
 A. Nickel is precipitates B. energy is released as heat C. Nickel dissolves D. both (B and C)
40. When an automobile battery is charging:
 A. energy as heat is converted to chemical energy
 B. kinetic energy is converted to chemical energy
 C. electrical energy is converted to chemical energy
 D. chemical energy is converted to electrical energy
41. The structural formula and molecular formula of a compound are similar in:
 A. number of the atoms present in a molecule B. type of the atoms present in a molecule
 C. bonding arrangement of the atoms D. both (A and B) are correct

42. Which of the following is incorrect?
 A. graphite is a fairly good conductor of electricity
 B. ethyne is a fuel used in oxyacetylene torches
 C. methylbenzene is a simplest aromatic hydrocarbons
 D. the octane rating of a fuel is a measure of its burning efficiency and its antiknock properties
43. Hydrocarbons are classified according to the:
 A. number of carbon atoms B. type of bonding between carbon atoms
 C. carbon isotopes D. mass of the compound
44. The number of hydrogen atoms for (2-methyl-1,3-butadiene) is equal to:-
 A. 6 B. 8 C. 10 D. 12
45. The name of the following compound: $\begin{matrix} \text{CH}_3-\text{CH}_2-\text{CH}_2 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_2-\text{CH}_3 \\ | \\ \text{CH}_3 \end{matrix}$, according to IUPAC system is:
 A. 2-methyl-3-propylpentane B. 2-methyl-3-ethylhexane
 C. 3-ethyl-2-methylhexane D. 3-ethyl-2-methylpentane
46. Which of the following is conjugate pair?
 A. HCl, Cl^+ B. H^+, OH^- C. $\text{NH}_4^+, \text{NH}_2^-$ D. none of them
47. In the following equilibrium reaction: $2\text{A}(\text{g}) \rightleftharpoons 2\text{B}(\text{g}) + \text{C}(\text{g})$, at 35°C it is determined that $[\text{C}]=0.01\text{M}$, $[\text{B}]=0.09\text{M}$ and $[\text{A}]=0.003\text{M}$ at equilibrium, by cooling the reaction to 10°C , the value of K will be 5, which of the following is correct?
 A. the value of K is equal to 9 at 35°C B. the reaction is exothermic
 C. the reaction is endothermic D. both (A and C) are correct
48. All of the following are buffer solutions **except**:
 A. NaCl, HCl B. human blood C. $\text{NH}_3, \text{NH}_4\text{NO}_3$ D. HCN, KCN
49. The molecular formula for the compound..... is C_6H_{14} .
 A. hexane B. 2-methylpentane C. 2,2-dimethylbutane D. all of them
50. The value of E°_{cell} for this spontaneous electrochemical reaction: $\text{M}^{2+} + \text{H}_2 \rightarrow \text{M} + 2\text{H}^+$ is 0.34V, then $E^\circ_{\text{reduce}} \text{M}^{2+}$ is:
 A. zero B. +0.34V C. -0.34V D. cannot be determined