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Group A: Multiple Choice Questions

Tick the correct answer. [11×1=11]

1. 0.1 M acetic acid ionise to an extent of 1.34%. Ionisation constant of acetic acid is
   a. 0.00134 b. 1.182
   c. 1.82×10^{-5} d. 2.8×10^{-6}
2. Half-life of a 1st order and zero order reaction are same. Then the ratio of the initial rates of 1st order reaction to that of the ero order reaction is
   a. $\frac{1}{0.693}$ b. 2×0.693
   c. 0.693 d. $\frac{2}{0.693}$
3. What is the molarity of the solution of barium hydroxide, if 35 mL of 0.1 M HCl is used in the titration of 25 mL of the barium hydroxide solution?
   a. 0.35 b. 0.07
   c. 0.28 d. 0.14
4. The reaction, $3ClO^-(aq) \longrightarrow ClO_3^-(aq) + 2Cl^-(aq)$ is an example of
   a. Oxidation reaction
   b. Reduction reaction
   c. Disproportionation reaction
   d. Decomposition reaction
5. Different ions will split up by different compounds to give
   a. same coloured complex
   b. different coloured complex
   c. same density complex
   d. same temperature complex
6. Which of the following are the correct matching of metals with the most commonly employed ores for their extraction?
   a. Fe: Chalcocite: Al: Bauxite
   b. Fe: Siderite; Al: Clay
   c. Fe: Haematite; Al: corundum
   d. Fe: Haematite; Al: Bauxite
7. In the nitration of benzene using a mixture of conc. H_2SO_4 and conc. HNO_3, the species which initiates the reaction is...
   a. NO_2 b. NO_2^+
   c. NO^+ d. NO_2^-
8. Which of the following compounds gives a secondary alcohol upon reaction with methylmagnesium bromide?
   a. Butyl formate b. 3- pentanone
   c. Pentanal d. Methyl butanoate
9. The specific gravity of cement is.....
   a. 2.5 b. 1.44
   c. 3.15 d. 30
10. ..... is utilized for applying the pulp slurry to a screen.
    a. Draining b. Pressuring
    c. Drying d. Forming
11. In nuclear reactor the control rods are made of
    a. graphite rod b. cadmium rod
    c. Au d. None of these

Group B: Short Answer Questions

Attempt all the questions. **[8×5=40]**

1. 20 cm^3 of a solution containing 7g/dm^3 of a metal hydroxide, XOH, were exactly neutralized with 25 cm^3 of 0.10M hydrochloric acid.
   i. Write a balanced chemical equation for the neutralization of the metal hydroxide, XOH, with hydrochloric acid. [1]
   ii. Calculate the concentration of the metal hydroxide in moles per dm^3. [2]
   iii. Calculate the molar mass of XOH. [1]
   iv. Identify element X. [1]

   OR

   Consider the exothermic reaction between reactants A and B?

   $A + B \longrightarrow E$ (fast)

   $E + B \longrightarrow C + D$ (slow)

   a. What is the order with respect to reactants A and B? [1]
   b. What is the rate law for the reaction? [2]
   c. Sketch a potential energy diagram for this reaction. Identify the activation energy for the overall forward reaction. Identify the location of reactants, intermediate(s), activated complex(es), and products. [2]
2. This question related to thermodynamics.
   a. How is free energy change of a reaction related to enthalpy change and entropy change? [2]
   b. Calculate the enthalpy of formation of ethane at 298K, if the enthalpies of combustion of C, H and C_2H_6 are - 94.14, - 68.47 and - 373.3 K cal. respectively. [3]
3. A metal 'M' can be extracted from haematite ore. Steel is an alloy of metal 'M.
   a. Write the principle involved in the manufacture of steel by Open-Hearth process. [2]
   b. How is metal 'M' rust by exposing in moist air? [2]
   c. What is the function of lime stone in the smelting of metal 'M' [1]
4. a. A haloalkane Ⓟ reacts with aq. KOH to give Q. The compound Ⓠ on oxidation with $K_2Cr_2O_7 + H^+$ gives Ⓡ and Ⓡ undergoes Clemmenson reduction to peoduce Ⓢ. The compound Ⓟ react with sodium in presence of dry ether to form 2, 3–dimethylbutane, write chemical reactions involved and identify P, Q, R and S. [1+1+1+1]
   b. What product would you expect when compound Ⓡ is treated with hydrocyanide? [1]
5. a. Write down the Isomeric alcohols of C_3H_8O and IUPAC name. Explain Victor-Meyer's method to distinguish them. [2+2]
   b. What happens when the product obtained by dehydrogenation of ethanol is allowed to react with Tollen's reagent? [1]
6. a. An aromatic compound 'P' on treatment with aqueous ammonia and heating forms compound 'Q' which on heating with Br_2 and KOH forms a compound 'R' of molecular formula C_6H_7N. Write the structures and IUPAC names of compounds A, B and C. [3]
   b. How can you prepare p-hydroxazobenzene from compound 'R'? [2]
7. a. Write the name of one drug which relief pain and also draw structure. [2]
   b. How can you distinguish addition and condensation polymer? [1]
   c. What is the function of CaO in the manufacture of cement? [2]
8. a. A monohydroxyl substituted benzene (A) is prepared from hydrolysis of diazonium salt. Compound (A) is heated with zinc dust gives (B). The compound (B) on Friedel-Craft alkylation with methyl chloride to give (C) which on oxidation with CeO_2 yield compound (D). Write the reaction involved and IUPAC name of A,B,C,D. [3]
   b. Convert compound A into m-nitrobenzoic acid. [2]

   OR

   Transition metals and their compounds are frequently used as catalysts.
   a. Name the catalyst in the Haber process for the manufacture of ammonia. [1]
   b. Name the catalyst used in the hydrogenation of carbon-carbon double bonds. [1]
   c. Name the catalyst in the Contact Process for the manufacture of sulphuric acid. [1]
   d. Draw the structure of: $[Cu(H_2O)_6]^{2+}$ and $[CuCl_4]^{2-}$ and write the shape of ion. [2]

Group C: Long Answer Questions **[3×8=24]**

9. a. Consider the reaction,

   $2Ag^+ + Cd \longrightarrow 2Ag + Cd^{2+}$

   The standard electrode potentials for $Ag^+ \longrightarrow Ag$ and $Cd^{2+} \longrightarrow Cd$ couples are 0.80 V and -0.40 V, respectively.
   i. What is the standard potential E^o for this reaction? [2]
   ii. For the electrochemical cell in which this reaction takes place which electrode is negative electrode? [2]
   b. How is single electrode potential originated? [1]
   c. Heat of combustion of compound are given as: [3]

CH_4	-210 Kcal
C	-94 Kcal
H_2	-68 Kcal

   Calculate the heat of formation of CH_4.

   OR

   a. Equal volumes of 0.02 M $AgNO_3$ and 0.02 M HCN were mixed. Calculate $[Ag^+]$ at equilibrium given, $K_{sp}(AgCN) = 2.2 \times 10^{-16}$ $K_a(HCN) = 6.2 \times 10^{-10}$. [4]
   b. A solution contains a mixture of Ag^+ (0.1M) and Hg_2^{2+} (0.1M) which are to be separated by selective precipitation. Calculate the maximum concentration of iodide ion at which one of them gets precipitated almost completely. What percentage of that metal ion is precipitated?

   $K_{sp}(AgI) = 8.5 \times 10^{-17}$, $K_{sp}(Hg_2I_2) = 2.5 \times 10^{-26}$. [4]
10. a. Arrange the compound in the complete reaction sequence with suitable reagent. [4]

    Aniline, benzenediazonium chloride, Benzonitrile, Benzamide, Benzoic acid

    b. Write the name of aldehyde with gives Tolles's test and shows aldol condensation reaction. [2]
    c. How is 2-hydroxypropanoic acid obtained from ethanal? [2]
11. a. An organic compound (A) which has characteristic odour, on treatment with NaOH forms two compounds

(B) and (C). Compound (B) has the molecular formula C_7H_8O which on oxidation with CrO_3 gives back compound (A). Compound (C) is the sodium salt of the acid. Compound (C) when heated with soda lime yields an aromatic hydrocarbon (D). Deduce the structures of (A), (B), (C) and (D). Write chemical equations for all reactions taking place. [4]

b. Why $-NH_2$ group of aniline is protected before nitration? [2]

c. Write a product which is obtained by the reduction of acetic anhydride. [2]

OR

a. Write the structures A, B and C in the following: [4]

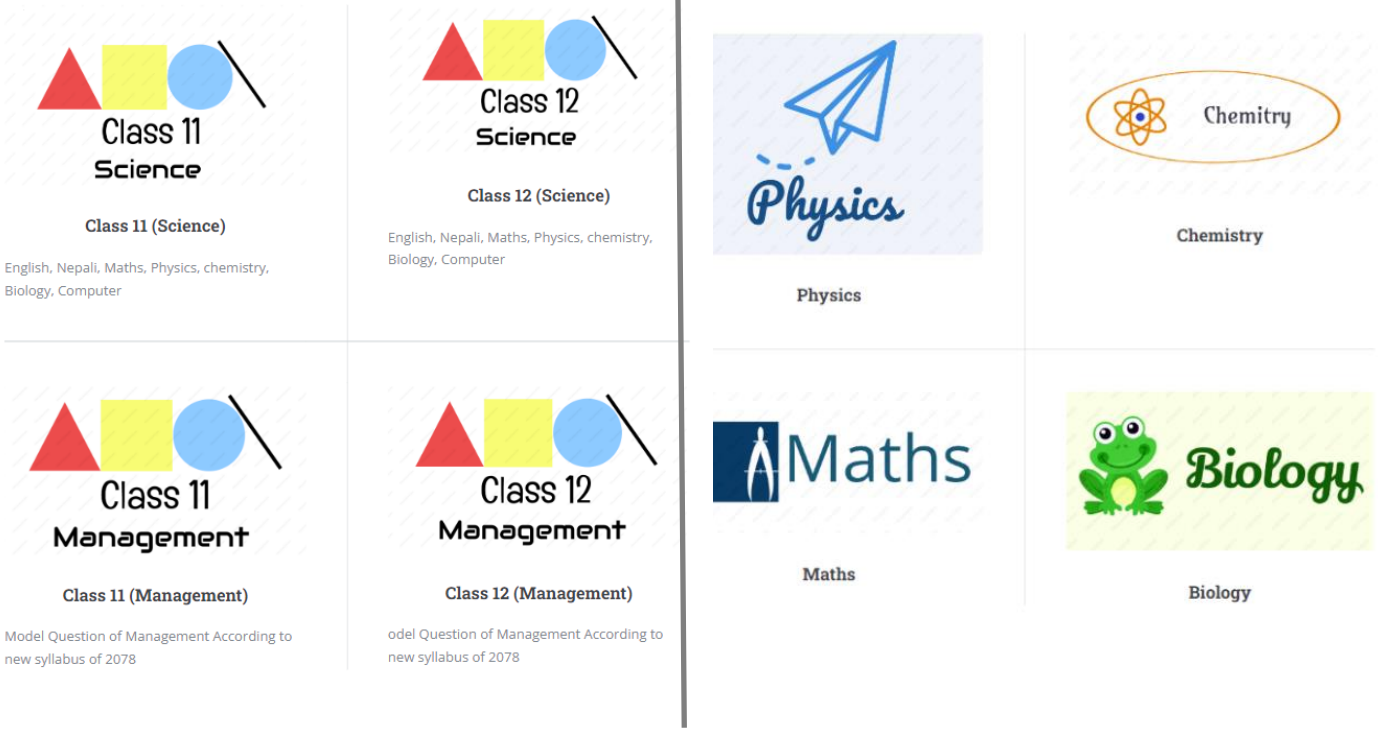
$$C_6H_5\text{-}CONH_2 \xrightarrow[\Delta]{Br_2 / KOH} A \xrightarrow[0-5\,^\circ C]{NaNO_2 / HCl} B \xrightarrow{KI} C$$

b. What happens when compound C is heated with sodium metal in the presence of dry ether? [2]

c. What product would you get when compound A and B are heated? [2]

BIPO's notes

Class 12 complete notes and paper collection and solutions.



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