HISSAN CENTRAL EXAMINATION - 2079 (2022)

Class: XII **F.M: 75**

Time: 3hrs

CHEMISTRY (3021 Set A)

(11 Marks Objective + 64 Marks Subjective)

GROUP A **Time: 25 Minutes**

Attempts all questions.

Multiple Choice Question:

Circle the correct answer. **[11 × 1 = 11]**

1. The concentration of a solution containing 9.8 g of H_2SO_4 in 100 ml of the solution is
   a) 0.1 N b) 0.1 M c) 1 N d) 1 M

2. pH of 1×10^{-8} HCl is
   a) 8 b) 7.96 c) 7 d) 6.96

3. The rate constant of a reaction is $1.2x10^{-3}molL^{-1}min^{-1}$ the order of the reaction will be
   a) 0 b) 1 c) 2 d) 3

4. Which one is the correct statement?
   a) Free energy increases as a galvanic cell delivers electric potential
   b) Lithium ion battery is non chargeable
   c) Fuel cells are chargeable
   d) Voltameter is not a galvanic cell

5. Sodium acetate is heated with soda line to give methane. The reaction is called
   a) decarbonylation b) decarboxylation
   c) clemmenson's reduction d) carbonylation

6. Vapour of alcohol is dehydrated by passing over
   a) conc.H_2SO_4 b) Al_2O_3
   c) CaO d) $CaCl_2$

7. Which transition metal is used for the reduction of steam to hydrogen?
   a) Mg b) Fe c) Ni d) Pt

8. Ethylbromide reacts with alcoholic silver nitrite to give
   a) Nitrolic acid b) Pseudonitrol
   c) Ethyl nitrite d) Nitroethane

9. The alkyl part of Grignard reagent in the reaction acts as
   a) Nucleophile b) Electrophile
   c) Base d) Both A and C

10. Which of the following elements is alloyed with copper to form brasses
    a) lead
    b) bismuth
    c) zinc
    d) antimony

11. RDX is used as
    a) an insecticide b) a preservative c) an explosive d) a sweetener

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GROUP B

Attempts all questions.

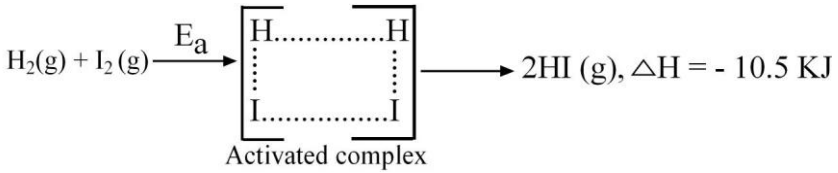
Short questions: **[8 × 5 = 40]**

1. A. Find the relationship between normality and molarity of a solution. [2]

   B. 20 ml of $\frac{M}{2}$ H_2SO_4, 30 ml of $\frac{M}{5}$ HCl and 50 ml of $\frac{M}{10}$ HNO_3 are mixed. Find the concentration of total acid in normality and also find the mass NaOH required for the complete neutralization of the acid mixture. [3]

OR

   A. Draw a labelled energy profile diagram indicating E_1, and E_2 as potential energies of reactants and product respectively, E_a as activation energy and ΔH as enthalpy of reaction that proceeds as [3]



   B. It is observed for the above reaction that rate = $k[H_2]\,[I_2]$
   Define rate constant k and calculate the value rate of constant (k) of the reaction with units, if the initial rate of formation of HI = 2.3×10^{-5} mol $L^{-1}s^{-1}$ at the initial concentration of $[H_2]$ = 0.1 mol / L and $[I_2]$ = 0.2 mol/L [2]

2. A. State Hess's law of constant heat summation. [1]

   B. Calculate the enthalpy of formation of $AlCl_3(s)$. Given

   (i) $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$, $\Delta H = -185$ kJ

   (ii) $HCl(g) + aq \longrightarrow HCl(aq)$, $\Delta H = -73.5$ kJ

   (iii) $AlCl_3(s) + aq \longrightarrow AlCl_3(aq)$, $\Delta H = -323$ kJ

   (iv) $2Al(s) + 6HCl(aq) \longrightarrow 2AlCl_3(aq) + 2H_2(g)$, $\Delta H = -1050$ kJ

   [4]

3. Rusting is one of the common types of corrosion in iron. It forms rust when exposed to moist atmosphere

   i) Define rusting of iron.

   ii) Write chemical reaction involved in the formation of rust.

   iii) What is meant by galvanization of iron?

   [1+3+1]

4. What happens when,

   a) cupric sulphate solution is warmed with glucose in alkaline medium.

   b) the precipitate obtained by adding NaCl solution in aqueous $AgNO_3$ is treated with sodium cyanide solution.

   c) mercuric chloride solution is treated with sulphur dioxide water.

   d) potassium iodide is dropped in cupric sulphate solution.

   e) Sodium hydroxide solution is added drop by drop in zinc sulphate solution till excess. [1+1+1+1+1]

5. A. Show your familiarity on elimination reaction of haloalkane. State Saytzeff's rule and illustrate the rule on dehydrohalogenation of 2-bromopentane. [1+2]

   B. How can you obtain Chloretone and Chloropicrin from trichloromethane. [2]

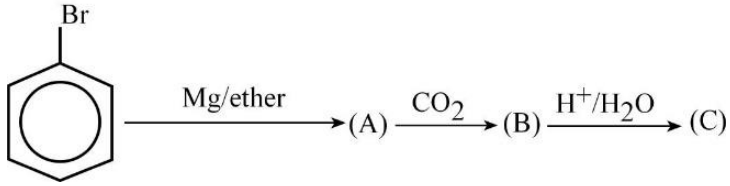
OR

   A. Write examples of following reactions.

   i) Wurtz-Fittig's reaction

   ii) Sandmeyer's reaction [2]

   B. Identify the compounds A, B and C in the following reaction sequence.



   [3]

6. a) Carboxylic acid and phenol turn moist blue litmus into red. How can you distinguish them by $NaHCO_3$ test? [1]

   b) Explain why are phenols less acidic than carboxylic acid. [2]

   c) What is the Labermann's test of phenol? [2]

7. A. The boiling point of ethyl amine is higher than methoxymethane but lower than methanoic acid although they have comparable molecular masses. Explain why? [2]

   B. How is diethyl oxalate used in separation of 1°, 2° and 3° amines from their mixture. [3]

8. An organic acid A having molecular formula $C_4H_8O_2$ when heated with ammonia gives the compound B C_4H_9ON. The compound B reacts with aq. Br_2 and NaOH to give compound C and the compound C when treated with aqueous $NaNO_2$ and HCl gives the compound D. The compound D gives +ve iodoform test and it gives propanone when heated with reduced Cu at 300°C. Identify A to D with chemical reactions. [5]

GROUP C **[3 × 8=24]**

9. A. a) Define buffer solution. How can you explain qualitatively that a buffer solution containing a mixture of NH_4OH and NH_4Cl has a capacity to resist the change in pH? [1+2]

   b) Explain why?

   i) aqueous CH_3COONa is basic whereas aqueous CH_3COONH_4 is neutral

   ii) NH_4^+ ion is a conjugate acid of Bronsted base NH_3. [1+1]

   B. Calculate the pH of the solution obtained by mixing equal volumes of solutions one having pH 5 and another having pH 10. [3]

OR

   A. State and explain second law of thermodynamics in terms of entropy change. [3]

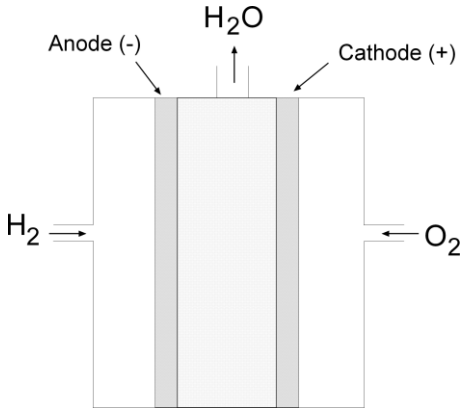
   B. a) Predict which one of the following redox reactions is a spontaneous reaction

   i) $Fe^{2+} + Sn^{4+} \longrightarrow Fe^{+3} + Sn^{2+}$

   ii) $Fe^{3+} + Sn^{2+} \longrightarrow Fe^{2+} + Sn^{4+}$

   Given $\varepsilon^\circ_{Sn^{4+}/Sn^{2+}} = +0.15\,V$ *and* $\varepsilon^\circ_{Fe^{3+}/Fe^{2+}} = +0.77\,V$ [2]

   C) the given figure is hydrogen - oxygen fuel cell



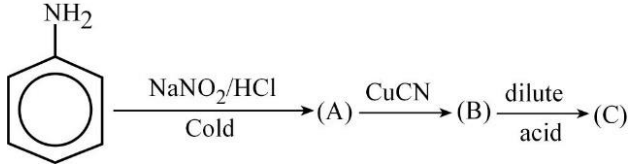
   i) Define fuel cell.

   ii) Write anodic and cathodic reaction involved in the cell. [1+2]

10. A. i) How is a Grignard reagent prepared? Starting from Grignard reagent, how can you obtain 1° 2° and 3° alcohol. [1+3]

   ii) Why is Grignard reagent stored in dry ether . [1]

   B. Identify A, B and C of the following.



[3]

OR

   A. Write the possible isomeric aldehydes and ketones that can be formed from C_4H_8O with their IUPAC names. Which one of them give iodoform test and why? Give reaction. [4]

   B. How are methanal and ethanal distinguished by observing the nature of reaction they show with the following reagents.

   a) aqueous NaOH b) Ammonia [4]

11. A. Write structural formula of each of,

   i) azodye ii) insecticide iii) pesticide iv) nylon-66 [4]

   B. Differentiate between PPC and OPC cement. [4]

THE END