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Group A: Multiple Choice Questions

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

1. K_{sp} for AgCl (mol. Wt. 143.5) is 17×10^{-11} at 298K. The molar solubility of AgCl at 298 K is
   a. 18.7×10^{-5} b. 2.3×10^{-3}
   c. 9.90×10^{-3} d. 1.3×10^{-5}
2. The rate of reaction between two specific time intervals is called
   a. instantaneous rate b. average rate
   c. specific rate d. ordinary rate
3. Find the concentration of HCl, if 10 mL of 0.5 M $Ca(OH)_2$ is required to titrate 50 mL of HCl.
   a. 5M b. 1/10M
   c. 10M d. 1/5M
4. The emf of the cell:
   Ni / Ni^{2+} (1.0 M) // Au^{3+} (1.0 M) / Au ($E° = -0.25$ V for Ni^{2+}/Ni; $E° = 1.5$ V for Au^{3+}/Au) is
   a. 1.25V b. -1.25V
   c. 1.75V d. 2.0V
5. Ions which are produced from the ligand are
   a. cation b. anion
   c. complex ion d. none of above
6. An alloy which does not contain copper is
   a. Bronze b. Magnalium
   c. Brass d. Bell metal
7. $CHCl_3$ reacts with conc. HNO_3 to give
   a. CCl_3NO_2 b. CH_3NO_2
   c. CH_3CN d. $CH_3CH_2NO_2$
8. Which of the following reagents, when treated with phenylmagnesiuim bromide followed by acid workup, will yield 2-phenylethanol?
   a. Ethanol b. Diethylether
   c. Ethanal d. Oxirane
9. Which element is the end product of natural radioactive series?
   a. Pb b. Sn
   c. C d. Bi
10. ..... is for further de-watering by squeezing water from the sheet.
    a. Draining b. Drying
    c. Pressuring d. Forming
11. The initial setting time of cement is not less than.....
    a. 30 sec b. 300 sec
    c. 30 min d. 300 min

Group B: Short Answer Questions

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

1. a. What is the importance of calculating normality factors of solution during titration? [2]
   b. 5.1g of impure sodium carbonate solution was dissolved in water to make 500 cm^3 of solution. 20 cm^3 of this solution was titrated against 20.45 cm^3 of 0.04M hydrochloric acid. Calculate the percentage purity of the sodium carbonate solid [3]

   OR

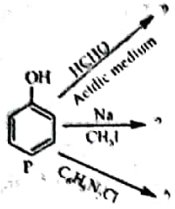
   Consider the reaction: $SO_2 + O_3 \longrightarrow SO_3 + O_2$. A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table.

$[SO_2]$ mol/L	$[O_3]$ mol/L	Initial Rate mol/(L,s)
0.25	0.40	0.118
0.25	0.20	0.118
0.75	0.20	1.062

   a. What is the order with respect to: SO_2 and O_3 ? [2]
   b. Write rate law equation. [1]
   c. Determine the value and units of the rate constant, k. [2]
2. a. How would you predict whether a reaction is spontaneous, non-spontaneous and equilibrium in term of free energy change? [2]
   b. Heat of formation of ethyl alcohol, water and carbon dioxide are -64.1 Kcal, -68.5 Kcal and -95 Kcal. Calculate the heat of combustion of ethyl alcohol. [3]
3. A metal 'M' is known as quick silver and it is used in thermometer.
   a. Write a reaction which is involved in the extraction of metal 'M'. [2]
   b. The one of the compound of metal 'M' having valency two, write the name of this compound which is used as electrode. [1]
   c. What happens when the above compound of metal 'M' is heated with KI solution? [2]
4. a. Write one example of each bidentate and polydentate ligang. [2]
   b. Draw the structure of square planar and tetrahedral metal complex ion. [1]
   c. What are the main factor that affect d-orbital splitting in energy? [2]
5. An haloakane having molecular formula C_3H_7Br.
   a. What happens when the secondary structure of above haloalkane is heated with sodium metal in the presence of dry ether? [1]
   b. Convert primary structure to secondary structure of above haloalkane. [2]
   c. How can you prepare butanoic acid from the primary structure of above haloalkane? [2]
6. a. Why is it difficult to undergo nucleophilic substitution in haloarene? [2]

b. What product would you expect when diazonium salt is heated with copper powder in the presence of HCl? [2]
c. Write the name of reaction in which chlorobenzene is converted into toluene. [1]

7. a. Draw the structural formula of the organic product of the following reactions. [3]



b. Convert compound P into benzaldehyde. [2]

8. a. Name the monomer of Nylon-6,6 and what type of polymer is Nylon-6,6? [2]
b. Write one example of each natural and synthetic dyes. [1]
c. What are main challenge to establish the cement factory in Nepal? How many grades of cement are available in Nepal?. [2]

OR

An organic compound having molecular formula C_3H_9N.

a. Write primary and secondary structure of above formula. [1]
b. How can you separate primary structure from secondary structure by Hoffmann's method? [2]
c. How can you test these two class of compound? [2]

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

9. a. Why is Ostwald's dilution law not applicable to strong electrolyte? [1]
b. Is an aqueous solution containing hydroxyl ion concentration 3.33×10^{-10} mol/L acidic, basic or neutral? [2]
c. What is the pH of the buffer composed of 0.1M solution of HCN in 0.1M KCN? The dissociation constant of HCN is 0.01. [2]
d. The solubility product of Ag_2CrO_4 at 25°C is 1.29×10^{-11} mol lit^{-3}. A solution of $K_2C_2O_4$ containing 0.1520 mole in 500 mL water is shaken with excess of Ag_2CO_3 till the following equilibrium is reached:
$Ag_2CO_3 + K_2C_2O_4 \rightleftharpoons Ag_2C_2O_4 + K_2CO_3$
At equilibrium the solution contains 0.0358 mole of K_2CO_3. Assuming the degree of dissociation of $K_2C_2O_2$ and K_2CO_3 to be equal, calculate the solubility product of Ag_2CO_3. [3]

OR

a. The standard electrode potential for the following electrodes are
$Mg^{2+} + 2e^- \longrightarrow Mg$, $E^o = -2.37$ V
$Fe^{3+} + e^- \longrightarrow Fe^{2+}$, $E^o = 0.77$ V
i. Represent a galvanic cell and point out which one is anode? [1]
ii. With 1M solution of ions what will be EMF? [2]
iii. Will the reaction $Mg^{2+} + 2Fe^{2+} \longrightarrow Mg + 2Fe^{3+}$ occur? Give reason. [2]
b. Calculate the bond energy of HCl. The bond energy of H_2 and Cl_2 are 430 kJ/mol and 242 kJ/mol respectively and standard enthalpy of formation of HCl is -91kJ/mol. [3]

10. a. How will you carry out the following conversions? [2×2]
i. Acetylene to Acetic acid
ii. Toluene to m-nitrobenzoic acid
b. An organic compound A(C_3H_6O) is resistant to oxidation but forms compound B (C_3H_8O) on reduction which reacts with HBr to form the bromide (C). C forms a Grignard reagent which reacts with A to give D ($C_6H_{14}O$). Give the structures of A, B, C and D and explain the reactions involved. [4]

11. a. An organic compound A(C_4H_8O) forms phenylhydrazone with phenylhyrazine and reduce Fehling's solution. It has negative iodoform test. Identify the organic compound A. [3]
b. Give reasons: [1.5+1.5]
i. Boiling point of ethanol is higher than ethanal having same molecular weight.
ii. pH of reaction should be carefully controlled while preparing ammonia derivatives of carbonyl compounds.
c. How do you obtain benzaldehyde from phenol? [2]

OR

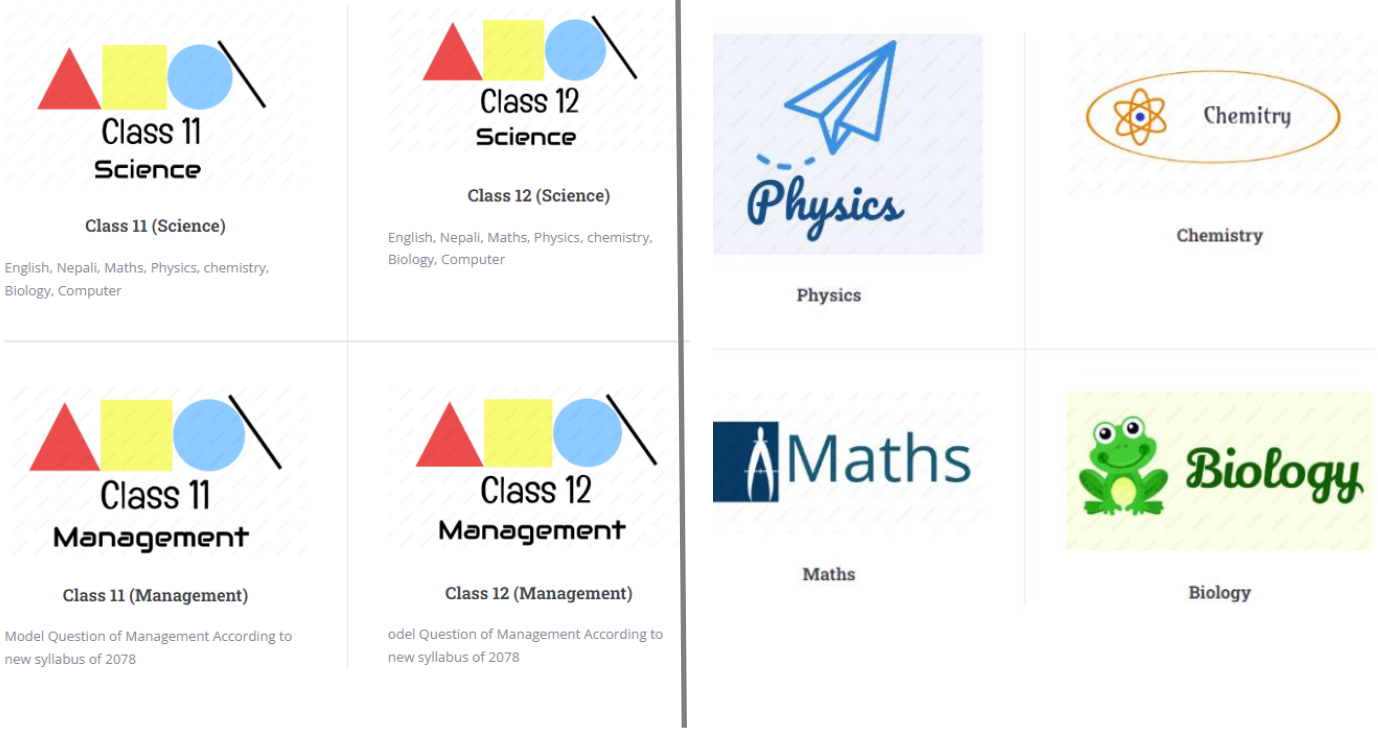
a. The list of organic compounds are given as: [5]

$C_3H_6O_2$, C_3H_5OCl, C_3H_7ON, C_2HH_7N, C_2H_6O

Write the sequence of reaction with proper reagent used.
b. Give one application of each: DNP test and Tollen's test with proper example. [1.5+1.5]

BIPO's notes

Class 12 complete notes and paper collection and solutions.



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