INDIAN SCHOOL SOHAR
PRE-BOARD II EXAMINATION (2021 – 22)
CHEMISTRY (043)

CLASS :   XII   MAX. MARKS : 35
DATE :   20.03.2022   TIME ALLOWED: 2 HOURS

GENERAL INSTRUCTIONS:
**Read the following instructions carefully.**
1. There are **12** questions in this question paper with internal choice.
2. **SECTION A – Q. No. 1 to 3** are very short answer questions carrying 2 marks each.
3. **SECTION B – Q. No. 4 to 11** are short answer questions carrying 3 marks each.
4. **SECTION C – Q. No. 12** is case based question carrying 5 marks.
5. **All questions are compulsory.**
6. **Use of Log tables and calculators is not allowed.**

SECTION A

1. a) Given that the standard electrode potential (E°) of metals are:

   K^+/K = -2.93 V, Ag^+/Ag = 0.80 V, Cu^{2+}/Cu = 0.34 V, Fe^{2+}/Fe = -0.44 V, Mg^{2+}/Mg = -2.37 V,

   Cr^{3+}/Cr = -0.74 V. Arrange these metals in an increasing order of their reducing power.   (1)

   b) Identify the reaction order from the following rate constant: k = 2.3 x 10^{-5} L$mol^{-1}s^{-1}$ (1)

2. Complete the following: (Any two)

   a) $C_6H_5COCH_3$ + 4[H] $\xrightarrow{Zn-Hg/Conc.HCl}$

   b) $2CH_3CHO$ $\xrightarrow{Dil.NaOH}$

   c) $(CH_3)_2C=O$ + $NaHSO_3$ →   (2)

3. State a condition under which is bimolecular reaction is kinetically first order reaction.   (2)

SECTION B

4. Write down the IUPAC name for the following complexes and indicate the oxidation state, electronic configuration and co-ordination number.

   a) $K[Cr(H_2O)_2(C_2O_4)_2].3H_2O$

   b) $[Co(NH_3)_5Cl]Cl_2$ (2 x 1½= 3)

5. Account for the following:

   (i) Cr^{2+} is reducing in nature while with the same d-orbital configuration (d^4) Mn^{3+} is oxidizing in nature.

   (ii) Transition metals and their compounds are generally found to be good catalysts.   (2 x 1½= 3)

6. Identify A to E in the following reactions:
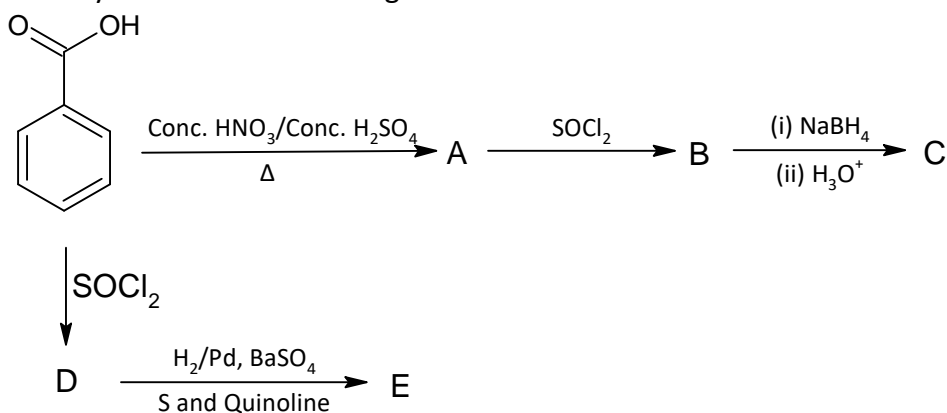
(3)

OR

Account for the following:

(a) Acetone is completely miscible with water while acetophenone is not.

(b) Carboxylic acids have higher boiling points than the alcohols of comparable molecular masses.

(c) Aldehydes are more volatile than the corresponding alcohols. (3 x 1 =3)

7. Observe the graph below and answer the questions that follow:
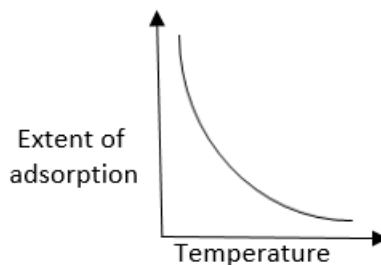
(a) Which phenomenon is represented in the graph? Define it.

(b) Explain the phenomenon with respect to the following:

(i) Specificity

(ii) Temperature dependence

(iii) Reversibility (2x1½ =3)

OR

a) In reference to Freundlich's adsorption isotherm, write the expression of adsorption of gases on solids in the form of an equation.

b) What are protective colloids? Which type of colloids are used as protective colloids? (2 x 1½ = 3)

8. For the first order thermal decomposition reaction the following data were obtained.

$C_2H_5Cl(g) \rightarrow C_2H_4(g) + HCl(g)$
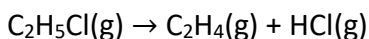
Time (s)	Total Pressure (atm)
0	0.30
300	0.50

Calculate the rate constant. (Given that log 4 = 0.6021)

OR

For the first order reaction, calculate the ratio of the time for 75% completion of the reaction to the 50% completion of the reaction. (Given that log 2 = 0.3010; log 3 = 0.4771) (3)

9. a) Draw the structure of 4-Methylpent-3-en-2-one.

b) State one chemical method to distinguish between aldehyde and acetone.

c) Write the chemical equation involved in Etard's reaction. (3 x 1 = 3)

OR

(i) Arrange the following in the increasing order of their boiling points.

n-Butane, n-Butyl alcohol, Butryaldehyde, Butryic acid, ethylmethyl ketone.

(ii) Name the aldehyde which does not give Fehling's test.

(iii) What happens when $(CH_3)_3CCOOH$ reacts with bromine in presence of red phosphorus? Write the equation. (3 x 1 = 3)

10. For the cell, $Ni(s)|Ni^{2+}||Ag^+(aq)|Ag(s)$. Calculate the equilibrium constant at 25^0C. How much maximum work would be obtained by the operation of this cell? $E^0_{Ni^{2+}/Ni}$= -0.25 V; $E^0_{Ag^+/Ag}$= 0.80 V. (antilog of 0.53 = 3.388; 1F = 96500 $Cmol^{-1}$) (3)

11. a) Co^{2+} is easily oxidized to Co^{3+} in the presence of strong ligand. Give reason.
    b)   On the basis of crystal field theory, write the electronic configuration of d^4 ion if Δ_o < P.

SECTION C (2 + 1 = 3)

12. Read the passage given and answer the questions that follow:

Amines are alkyl or aryl derivatives of ammonia formed by replacement of one or more hydrogen atoms. Alkyl derivatives are called aliphatic amines and aryl derivatives are known as aromatic amines. The presence of aromatic amines can be identified by performing dye test. Aniline is the simplest example of aromatic amine. It undergoes electrophilic substitution reactions in which $-NH_2$ group strongly activates the aromatic ring through delocalization of lone pair of electrons of N-atom. Aniline undergoes electrophilic substitution reactions. *Ortho* and *Para* positions to the $-NH_2$group becomes centers of high electron density.

Thus,-NH_2group is *Ortho* and *Para*-directing and powerful activating group.

(a) How will you distinguish cyclohexylamine from aniline?
(b) What is the major product obtained by acetylation of aniline followed by nitration (Conc. HNO_3 + Conc. H_2SO_4) and then alkaline hydrolysis?
(c) What product is formed when aniline reacts with conc. HNO_3 and conc. H_2SO_4? Write the equation.
(d) Account for the following statement: Aniline does not undergo Friedel-Crafts reaction.

OR

What does aniline produce in carbylamine reaction? Write chemical equation of the reaction involved? (1+1+1+2)