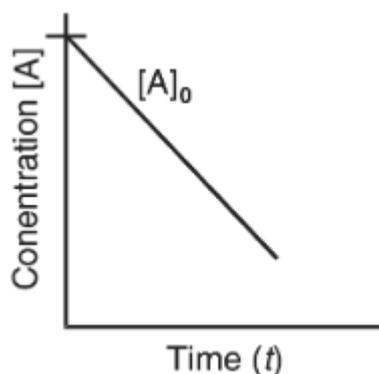


General Instructions:

- (a) All questions are compulsory.
- (b) Q.no. 1 to 5 are very short answer questions and carry 1 mark each.
- (c) Q.no. 6 to 10 are short answer questions and carry 2 marks each.
- (d) Q.no. 11 to 22 are also short answer questions and carry 3 marks each
- (e) Q.no. 23 is a value based question and carries 4 marks.
- (f) Q.no. 24 to 26 are long answer questions and carry 5 marks each
- (g) Use log tables if necessary, use of calculators is not allowed.

-
1. How is Brownian movement responsible for the stability of a sol ?
 2. Draw the structure of XeF_4 .
 3. Write the formula for Pentaamminenitrito–O– Cobalt (III)
 4. For a reaction : $\text{R} \rightarrow \text{P}$, the change in concentration of reactant w.r.t. time is shown by following graph. What is the order of the reaction ?



5. Arrange the following in the increasing order of basic strength.

Aniline, p-toluidine, p-nitroaniline.

6. i) Name the defect introduced in a solid NaCl crystal when divalent cations (M^{2+}) are added to molten NaCl ?

ii) Define F-centre. Mention its one consequence.

7. Calculate the equilibrium constant for the reaction at 25°C.



Given that $E^{\circ}(\text{Ag}^+/\text{Ag}) = 0.80\text{V}$ and $E^{\circ}(\text{Cu}^{2+}/\text{Cu}) = 0.34\text{V}$

8. Aluminium crystallizes in an fcc structure. Atomic radius of the metal is 125 pm. What is the length of the side of the unit cell of the metal?

9. Calculate the degree of dissociation of acetic at 298K, given that

$$\Lambda^{\circ}\text{m}(\text{CH}_3\text{COO}^-) = 40.9 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\Lambda^{\circ}\text{m}(\text{H}^+) = 349.1 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\Lambda\text{m}(\text{CH}_3\text{COOH}) = 11.7 \text{ S cm}^2 \text{ mol}^{-1}$$

OR

The resistance of a conductivity cell containing 0.01 M KCl solution at 298K

is 1500Ω . What is the cell constant if the conductivity of 0.001 M KCl solution at 298K is $0.146 \times 10^{-3} \text{ S cm}^{-1}$?

10. 15 g of an unknown molecular substance was dissolved in 450 g of water. The resulting solution was found to freeze at -0.34°C . What is the molar mass of this substance. (K_f for water = $1.86 \text{ K mol}^{-1} \text{ kg}$)

11. What is the role of following :

i) SiO_2 in the metallurgy of Cu.

ii) Cryolite in the metallurgy of aluminium

iii) I_2 in the purification of zirconium

12. Account for the following :—

i) Molecular masses of polymers are mostly determined by osmotic pressure method .

ii) The freezing point depression of 0.01 m NaCl is nearly twice that of 0.01 m glucose solution

- iii) Ethylene glycol is used as antifreeze in radiators of vehicles in cold Countries.

13. A first order reaction has a rate constant $1.15 \times 10^{-3} \text{ s}^{-1}$. How long will 5 g of this reactant take to reduce to 3 g ? ($\log 5 - \log 3 = 0.2219$)

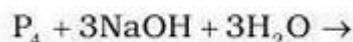
OR

The rate of a reaction triples when the temperature changes from 20°C to 50°C . Calculate the energy of activation. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$, $\log 3 = 0.48$)

14. i) Arrange the following in the order of the property indicated for each set :

- a) HF, HCl, HBr, HI (decreasing acid strength).
b) NH_3 , PH_3 , AsH_3 , SbH_3 , BiH_3 (decreasing bond angle)

ii) Complete the reaction



15. i) Account for the fact that $[\text{NiCl}_4]^{2-}$ is paramagnetic while $[\text{Ni}(\text{CO})_4]$ is diamagnetic though both are tetrahedral

ii) Draw the structure of *cis*-tetraamminedichloridochromium(III)

iii) What is the effect of synergic bonding interactions in a metal carbonyl complex?

16.i) Write chemical equation for the preparation of hydrated ferric oxide sol by hydrolysis

ii) Define peptisation

iii) What are aerosols?

17.i) Give reason :

- a) vinyl chloride is unreactive in nucleophilic substitution
b) Chloroform is stored in dark coloured bottles

ii) Write the structure of the compound : 2-Bromo-3-methylpentane

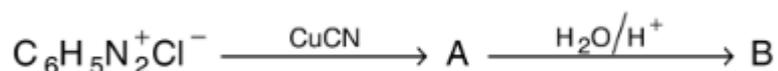
18. An organic compound A ($C_3H_6O_2$) on reaction with ammonia followed by heating yields B. Compound B on reaction with Br_2 and alc. NaOH gives compound C (C_2H_7N). Compound C forms a foul smelling compound D on reaction with chloroform and NaOH. Identify A, B, C, D and write the equations of reactions involved.

19 i). Write a chemical test to distinguish between

a) methanoic acid, ethanoic acid

b) propan-1-ol, propan-2-ol

ii) Identify A & B



20.i) Exemplify the following reactions:

a) Rosenmund reduction.

b) Hell volhard zelinsky reaction.

ii) Arrange the following compounds in increasing order of their reactivity towards HCN: Acetaldehyde, Acetone, Di-tert-butyl ketone.

21.i) Write the name and structure of the monomers of the following polymers. a) Terylene b) Buna-S

ii) A biodegradable polymer is used in speciality packaging, orthopaedic devices and in controlled release of drugs. Identify the polymer and give its structure.

22.i) Name the four bases present in DNA

ii) Explain what is meant by : a) a peptide linkage b) a glycosidic linkage

23. Reema wants to bake a cake for her friend's birthday, who is diabetic. She uses artificial sweetener in place of sugar.

i) Name an artificial sweetener

ii) Write a disadvantage of using artificial sweetener

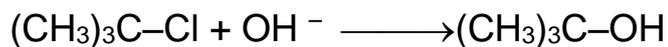
iii) What values are expressed in the above gesture of Reema?

24. i) How is the following conversion carried out?

Phenol to acetophenone

ii) Write briefly on hydroboration oxidation of alkenes.

iii) Give the mechanism of the following reaction :



iv) Write the product of the following reaction

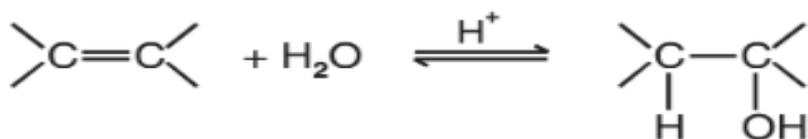


OR

i) Convert methanal to ethanol

ii) How is phenol prepared from cumene?

iii) Write the mechanism of the following reaction



iv) Complete the following reaction



25. i) Write complete chemical equation for the following reaction

In alkaline medium potassium permanganate oxidizes iodide to iodate .

ii) Give reason : Ce exhibits +4 oxidation state

iii) A mixed oxide of Fe and Cr is fused with Na_2CO_3 in the presence of air to form a yellow compound (A), On acidification the compound (A) forms an orange coloured compound (B) which is a strong oxidising agent. Identify

the compounds (A) & (B) Write balanced equation for each step.

OR

i) Write complete chemical equation for :

oxidation of Fe^{2+} by $\text{Cr}_2\text{O}_7^{2-}$ in acidic medium

ii) Give reason -

Actinoid contraction from element to element is greater than lanthanoid contraction

iii) A blackish brown coloured solid A when fused with alkali metal hydroxide in presence of air produces a dark green coloured compound B which on electrolytic oxidation in alkaline medium gives a dark purple compound C. Identify A, B, C & write the reactions involved

26. Assign a possible reason for the following :

- i) Stability of +5 oxidation state decreases and that of +3 oxidation state increases down the group 15 elements.
- ii) H_2O is less acidic than H_2S .
- iii) SF_6 is inert while SF_4 is highly reactive towards hydrolysis.
- iv) H_3PO_2 and H_3PO_3 act as reducing agents while H_3PO_4 does not.
- v) Helium gas is used by scuba drivers

OR

Give reason for each of the following :

- i) NH_3 is more basic than PH_3
- ii) Halogens are coloured.
- iii) Bleaching by SO_2 is temporary.
- iv) PCl_5 is ionic in solid state.
- v) Sulphur in vapour state exhibits paramagnetic behaviour

Ms. Rani Garg
