

PREBOARD EXAMINATION 2022

TERM II

CHEMISTRY THEORY (043)

M.M: 35

TIME: 2 HRS

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.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. Arrange the following in the increasing order of their property indicated.

(ANY 2) (1 x 2)

- A.** Acetaldehyde, Benzaldehyde and formaldehyde (reactivity towards nucleophilic addition reaction)
- B.** 2,4-dinitrobenzoic acid, 4 methoxy benzoic acid, 4 nitrobenzoic acid (acidic character)
- C.** Ethanol, Ethanal, Ethanoic acid (boiling points)

2. The resistance of 0.5 M CH_3COOH solution is 100 ohms. The Cell constant is 0.035 Cm^{-1} . Calculate molar conductivity of solution? **(2)**

3. Give reason: **(1 x 2)**

- a) The alpha hydrogen atoms of aldehyde and ketones are acidic in nature.
- b) Benzoic acid doesnot give Friedel- Crafts Reaction .

SECTION B

4. Account for the following: **(1 x 3)**

- a) Aniline is weaker base than Ammonia.
- b) Aromatic amines cannot be prepared by Gabriel phthalimide synthesis.
- c) Boiling point of methylamine is less than methanoic acid.

OR

4. Convert the following: **(1 x 3)**

- a) Benzoic acid to Aniline
- b) Aniline to N- Phenylethanamide.
- c) Ethanoic acid to Methanamine.

5. a) Explain why $[\text{Ni}(\text{CN})_4]^{2-}$ is colourless while $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green. **(1)**

b) Write the Hybridisation and IUPAC name of the complex $[\text{Ni}(\text{CO})_4]$

(Atomic Number of Ni = 28) **(2)**

OR

a) On the basis of crystal field theory write the electronic configuration for d^4 ion if $\Delta_o > P$. **(1)**

b) For the complex $[\text{Fe}(\text{CN})_6]^{3-}$ write the magnetic character and spin nature of the complex. (Atomic No Of Fe = 26) **(2)**

6. Account for the following: **(1 x 3)**

- a) E^0 values of Mn, Ni and Zn are more negative than expected.
- b) Ti^{2+} is a strong reducing agent.
- c) Transition metal ion form complexes.

7. A, B and C are three non-cyclic functional isomers of a carbonyl compound with molecular formula C_4H_8O . Isomers A and C give positive Tollens's test whereas isomer B does not give tollens test but gives positive Iodoform test. Isomers A and B on reduction with $Zn(Hg)/ conc\ HCl$ give the same Product D.

a) Write the structure of A, B, C and D. **(2)**

b) Out of A, B and C isomers which one is least reactive towards addition of HCN. **(1)**

8. a) Why ammonia gas is adsorbed more readily than nitrogen gas on the surface of charcoal? **(1)**

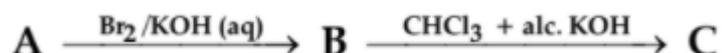
b) Define krafts temperature. **(1)**

c) what is a collodion solution? **(1)**

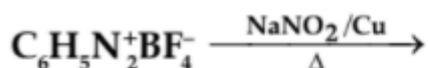
9. An aromatic compound 'A' on heating with Br_2 and KOH forms a compound 'B' of molecular formula C_6H_7N Which on reacting with $CHCl_3$ and alcoholic KOH produces a foul smelling compound 'C'. Write the structure and IUPAC names of compound A, B and C. **(3)**

Or

Write the structures of compounds A, B and C in the following reactions: **(3)**



b)



10. Calculate the cell emf and ΔG for the cell reaction at $25^\circ C$ for the cell:

$Zn(s) / Zn^{2+}(0.0004\ M) // Cd^{2+}(0.2\ M) / Cd(s)$ E^0 values at $25^\circ C$, $Zn^{2+} / Zn = 0.763\ V$, $Cd^{2+} / Cd = -0.403\ V$, $F = 96500\ coulomb$, $R = 8.314\ J\ K^{-1}mol^{-1}$.

$\log 2 = 0.3010$

(3)

11. Account for the following: (1 x 3)

- a) The lowest oxide of transition metal is basic whereas the highest oxide is amphoteric or acidic.
- b) CuCl_2 is more stable than Cu_2Cl_2
- c) Atomic radii of 4d and 5d series elements are nearly same.

OR

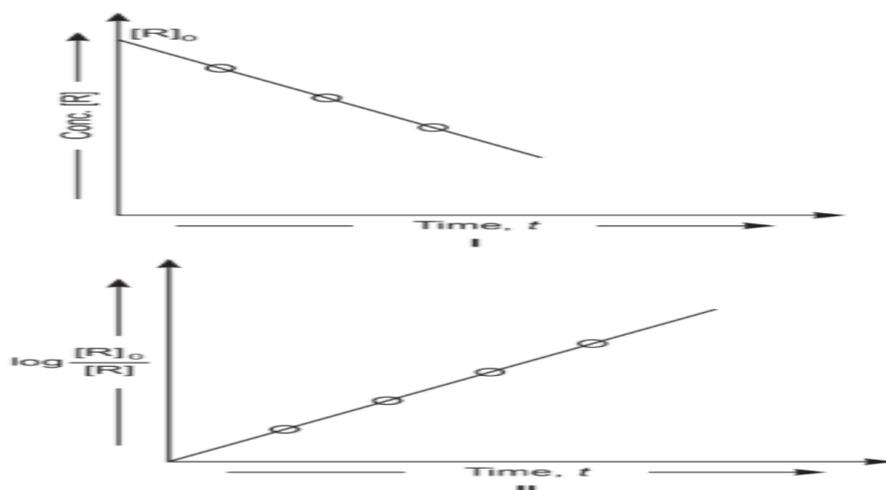
- a) Why Zn^{2+} salts are white while Cu^{2+} salts are coloured? (1)
- b) Why the highest oxidation state of transition metal is exhibited in its oxide or fluorides? (1)
- c) Why are zinc, cadmium and mercury soft metals? (1)

SECTION C

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

Chemical kinetics deals with rate of chemical reactions, how fast reactants get used up or how fast products are formed in the reaction. Different chemical reactions have different speed. Rate of reaction depends upon concentration of reactants, temperature, pressure especially in gaseous reactions and presence of catalyst.

Observe the following graphs and answer the questions based on these graphs.



- (a) What is order of reaction shown in graph I? **(1)**
- (b)** What is slope in graph II? **(1)**
- (c) How does $t_{1/2}$ varies with initial concentration in zero order reaction. **(1)**
- (d) If $t_{1/2}$ of first order reaction is 40 minute, what will be $t_{99.9\%}$ for first order reaction? **(2)**

OR

- (d) What is $t_{1/2}$ of zero order reaction in terms of 'k'? **(2)**