

### ONE MARK QUESTIONS

1. What are ambident ligands? Explain giving example.
2. Write the IUPAC name of the ionization isomer of  $[\text{Pt}(\text{NH}_3)_3\text{Br}] \text{Cl}$
3. Write the formula of  $\text{CrCl}_3 \cdot 5\text{H}_2\text{O}$  that furnishes 2 moles of Chloride ions per mole of salt.

### TWO MARK QUESTIONS

1. i) Write down the IUPAC name of the following complex :  $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$   
(ii) Write the formula for the following complex : tris(ethane-1,2-diamine)chromium(III) chloride (2015)
2. Write IUPAC names of the following:  
a)  $[\text{Co}(\text{NH}_3)_5\text{Cl}] \text{Cl}_2$  b)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$

### THREE MARK QUESTIONS

1. a) What type of isomerism is shown by  $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$  ?  
b) On the basis of crystal field theory, write the electronic configuration for  $d^4$  ion if  $\Delta_o < P$ .  
c) Write the hybridization and shape of  $[\text{Fe}(\text{CN})_6]^{3-}$ .

(Atomic number of Fe = 26) (2015)

2. Give the formula of the compound

- a) Nitrito – N-pentaamminecobalt(III)nitrate
- b) Potassium hexacyanocobaltate(III)
- c) Hexaammineplatinum(IV)chloride

- (a) How do you prepare:

5 Marks

- (i)  $\text{K}_2\text{MnO}_4$  from  $\text{MnO}_2$ ?
- (ii)  $\text{Na}_2\text{Cr}_2\text{O}_7$  from  $\text{Na}_2\text{CrO}_4$ ?

- (b) Account for the following:

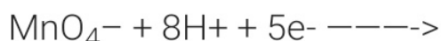
- (i)  $\text{Mn}^{2+}$  is more stable than  $\text{Fe}^{2+}$  towards oxidation to +3 state.
- (ii) The enthalpy of atomization is lowest for Zn in 3d series of the transition elements.
- (iii) Actinoid elements show wide range of oxidation states.

- (i) Name the element of 3d transition series which shows maximum number of oxidation states.

5-Marks

Why does it show so?

- (ii) Which transition metal of 3d series has positive  $E^\circ(\text{M}^{2+}/\text{M})$  value and why?
- (iii) Out of  $\text{Cr}^{3+}$  and  $\text{Mn}^{3+}$ , which is a stronger oxidizing agent and why?
- (iv) Name a member of the lanthanoid series which is well known to exhibit + 2 oxidation state.
- (v) Complete the following equation:

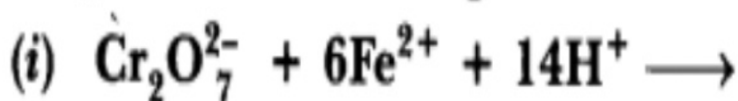


How would you account for the following?

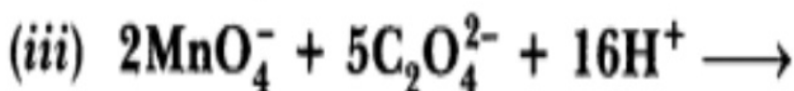
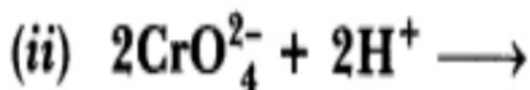
3-Marks

- (i) Transition metals exhibit variable oxidation states.
- (ii) Zr ( $Z = 40$ ) and Hf ( $Z = 72$ ) have almost identical radii.
- (iii) Transition metals and their compounds act as catalyst.

**Complete the following chemical equations:**



3 marks



Explain each of the following observations:

3 - Marks

- (i) With the same d-orbital configuration (d<sup>4</sup>), Cr<sup>2+</sup> is a reducing agent while Mn<sup>3+</sup> is an oxidising agent.
- (ii) Actinoids exhibit a much larger number of oxidation states than the lanthanoids.
- (iii) There is hardly any increase in atomic size with increasing atomic numbers in a series of transition metals.

(a) Calculate the number of unpaired electrons in the following gaseous state ions:

Mn<sup>2+</sup>, Cr<sup>3+</sup>, V<sup>3+</sup> and Fe<sup>2+</sup>

5 - Marks

which one of these is the most stable in aqueous solutions?

(At. nos. V = 23, Cr = 24, Mn = 25, Fe = 26)

(b) Explain the following observations:

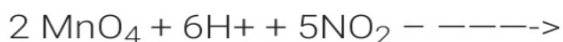
- (i) The transition metal ions are usually coloured in aqueous solutions.
- (ii) Cu(I) is not stable in an aqueous solution.
- (iii) The highest oxidation state of a transition metal is exhibited in its oxide or fluoride.

(a) How would you account for the following:

- (i) Actinoid contraction is greater than lanthanoid contraction.
- (ii) Transition metals form coloured compounds.

(b) Complete the following equation:

3 - Marks



The number of ions formed on dissolving one molecule of FeSO<sub>4</sub>·(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>·6H<sub>2</sub>O in water is:

[1]

(a) 3

(b) 4

(c) 5

(d) 6

MLA

1 - Mark

Assertion (A): Magnetic moment values of actinides are lesser than the theoretically predicted values.

1 - Mark

Reason (R): Actinide elements are strongly paramagnetic. [1]

The formula Co(NH<sub>3</sub>)<sub>5</sub>CO<sub>3</sub>Cl could represent a carbonate or a chloride. Write the structures and names of possible isomers. [2]

Using Valence Bond Theory, explain the following in relation to the paramagnetic complex

[Mn(CN)<sub>6</sub>]<sup>3-</sup>:

3 - Marks

(A) Type of hybridization

(B) Magnetic moment value

(C) Type of complex : inner, outer orbital complex: [3]

Answer the following:

(A) Why are all copper halides known except that copper iodide?

5 Marks

(B) Why is the E°(V<sup>3+</sup>/V<sup>2+</sup>) value for vanadium comparatively low?

(C) Why HCl should not be used for potassium permanganate titrations?

(D) Explain the observation, at the end of each period, there is a slight increase in the atomic radius of d-block elements.

(E) What is the effect of pH on dichromate ion solution? [5]

