

**BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA**

**QUESTION BANK**  
**CHAPTER - 8 – d AND f BLOCK ELEMENTS**

**Very short answer type questions – 1 Mark**

- Q1 : Name two ores of Titanium.
- Q2 : Why chromium is used for coating iron ?
- Q3 : Why do transition elements show variable oxidation states?
- Q4 : Though a transition element scandium does not show variable oxidation states. Why?
- Q5 : Transition elements and their compounds generally exhibit a paramagnetic behaviour. Give reason.
- Q6 : What are interstitial compounds?
- Q7 : The chemistry of actinoids is not smooth as that of lanthanoids .Give reason.
- Q8 : Lanthanum and lutetium do not show colouration in solutions .Why?
- Q9 : Zr and Hf have almost identical radii. Give reason.
- Q10 : The metallic radii of 5d series are virtually the same as those of the corresponding group member of 4d series Give reason.

**Short answer type questions – 2 Marks**

- Q1 : What is lanthanoid contraction? What are its two consequences?
- Q2 : Assign reason for the following:  
(a) Transition metals generally form coloured compounds.
- Q3 : What is meant by disproportionation of an oxidation state? Give an example.
- Q4 : How do atomic and ionic sizes vary from left to right in 3d transition series? Why?
- Q5 : Why do transition metals act as catalyst?
- Q6 :  $\text{Cr}^{2+}$  is a strong reducing agent, whereas  $\text{Mn}^{3+}$  with the same configuration is an oxidising agent. Why?
- Q7 : Explain the following observation :  
(a)  $\text{Cu}^+$  ion are not stable in an aqueous solution  
(b) Zinc is not regarded as a transition element
- Q8 : Write balanced chemical equation of two reactions in which  $\text{KMnO}_4$  act as oxidising agent in acidic medium.
- Q9 : How do you account for the following – In a transition series of metals, the metal which exhibits the greatest number of oxidation state occurs in the middle of the series?
- Q10 : Explain the following observation – The enthalpies of atomization of transition metals are quite high.

### Long answer type questions – 3 Marks

Q1 : Account for the following :

(a) The lowest oxide of a transition metal is basic, the highest is amphoteric or acidic.

(b)  $\text{Co}^{2+}$  ion is stable in aqueous solution, it is easily oxidized to  $\text{Co}^{3+}$  in the presence of a strong ligand.

(c) In 3d series from Sc to Zn, the enthalpy of atomization of Zn is the lowest.

Q2 : Describe the preparation of  $\text{KMnO}_4$  from pyrolusite ore. Write the ionic equation for the reaction that takes place between acidified  $\text{KMnO}_4$  solution and  $\text{Fe}^{2+}$  ions.

Q3 : Describe the preparation of potassium dichromate from chromite ore with chemical equations involved. What is the effect of pH on a solution of potassium dichromate?

Q4 : Compare the stability of +2 oxidation state for the elements of first transition series.

Q5 : Explain the following :

(a) Metal metal bonding is more extensive in 4d and 5d series of transition elements than 3d series.

(b)  $\text{Mn}^{3+}$  undergoes disproportionation reaction easily.

(c)  $\text{Co}^{2+}$  is easily oxidized in the presence of strong ligands.

Q6 : Assign suitable reasons for the following :

(a)  $\text{Sc}^{3+}$  is colourless in aqueous solution whereas  $\text{Ti}^{3+}$  is coloured.

(b)  $\text{Mn}^{2+}$  is much more resistant than  $\text{Fe}^{2+}$  towards oxidation.

(c) Interstitial compounds are well known for transition metals. Q7 :

Account for the following :

i)  $\text{Ce}^{4+}$  is a strong oxidizing agent in an aqueous solution

ii) Transition metals have high enthalpy of atomization

iii) Mn shows maximum number of oxidation states in 3d series

Q8 : Complete the following equations :

i)  $2\text{MnO}_4^- + 6\text{H}^+ + 5\text{NO}_2^- \rightarrow$

ii)  $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \rightarrow$

Q9 : Account for the following :

i) Transition metals form coloured compounds

ii)  $\text{Cr}^{2+}$  is a stronger reducing agent

iii) Actinoids show irregularities in their electronic configurations.

### Long answer type questions – 5 Marks

Q1 : (a) Calculate the number of unpaired electrons in the following gaseous state ions -  $Mn^{3+}$ ,  $Cr^{3+}$ ,  $V^{3+}$ ,  $Fe^{2+}$

Which one of these is most stable in aqueous solution?

(Atomic no. of Mn = 25, Cr = 24, V = 23, Fe = 26)

(b) Explain the following observations :

- (i) The highest oxidation state of a transition metal is exhibited in its oxide or fluoride.
- (ii) Transition metals form a large number of complexes.
- (iii)  $Mn^{3+}$  is a good oxidizing agent.

Q2 : Explain the following observations :

- (a) In general, the atomic radii of a transition elements decrease with atomic number in a given series.
- (b) Although F is more electronegative than oxygen, the highest Mn fluoride is  $MnF_4$  whereas the highest oxide is  $Mn_2O_7$ .
- (c) Transition metals and many of their compounds act as good catalyst. (d) Scandium doesnot exhibit variable oxidation state yet it is considered as a transition element
- (e) The colour of potassium dichromate solution changes with change of pH of the solution