



## d -and f -Block Elements

### Q.No.1:

Explain the following observations:

- (i) Transition elements generally form coloured compounds.
- (ii) Zinc is not regarded as a transition element.

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### Q.No.2:

How would you account for the following?

- (i) The atomic radii of the metals of the third (5d) series of transition elements are virtually the same as those of the corresponding members of the second (4d) series.
- (ii) The  $E^\circ$  Value for the  $Mn^{3+}/Mn^{2+}$  couple is much more positive than that for  $Cr^{3+}/Cr^{2+}$  couple or  $Fe^{3+}/Fe^{2+}$  couple.
- (iii) The highest oxidation state of a metal is exhibited in its oxide or fluoride.

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### Q.No.3:

Complete the following chemical equations:

- (i)  $Cr_2O_7^{2-} + H^+ + I^- \rightarrow$
- (ii)  $MnO_4^- + NO_2^- + H^+ \rightarrow$

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### Q.No.4:

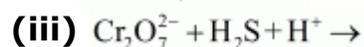
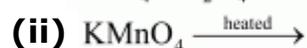
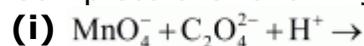
Explain the following observations giving as appropriate reason for each.

- (i) The enthalpies of atomization of transition elements are quite high.
- (ii) There occurs much more frequent metal-metal bonding in compounds of heavy transition metals (i.e 3<sup>rd</sup> series).
- (iii)  $Mn^{2+}$  is much more resistant than  $Fe^{2+}$  towards oxidation.

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### Q.No.5:

Complete the following chemical equations:



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**Q.No.6:**

Assign reasons for each of the following:

(i) Transition metals generally form coloured compounds.

(ii) Manganese exhibits the highest oxidation state of +7 among the 3d series of transition elements.

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**Q.No.7:**

(a) Which metal in the first transition series (3d series) exhibits + 1 oxidation state most frequently and why?

(b) Which of the following cations are coloured in aqueous solutions and why ?  
 $\text{Sc}^{3+}$ ,  $\text{V}^{3+}$ ,  $\text{Ti}^{4+}$ ,  $\text{Mn}^{2+}$  (At. Nos. Sc = 21, V = 23, Ti = 22, Mn = 25)

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**Q.No.8:**

How would you account for the following?

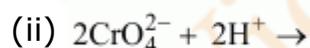
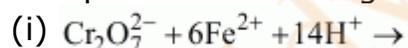
(i) Transition metals exhibit variable oxidation states.

(ii) Zr (Z = 40) and Hf (Z = 72) have almost identical radii.

(iii) Transition metals and their compounds act as catalyst.

**OR**

Complete the following chemical equations:



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**Q.No.9:**

Explain the following giving an appropriate reason in each case.

(i)  $\text{O}_2$  and  $\text{F}_2$  both stabilize higher oxidation states of metals but  $\text{O}_2$  exceeds  $\text{F}_2$  in doing so.

(ii) Structures of Xenon fluorides cannot be explained by Valence Bond approach.

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**Q.No.10:** (a) How do you prepare:

(i)  $K_2MnO_4$  from  $MnO_2$ ?

(ii)  $Na_2Cr_2O_7$  from  $Na_2CrO_4$ ?

(b) Account for the following:

(i)  $Mn^{2+}$  is more stable than  $Fe^{2+}$  towards oxidation to +3 state.

(ii) The enthalpy of atomisation is lowest for Zn in 3d series of the transition elements.

(iii) Actinoid elements show wide range of oxidation states.

**OR**

(i) Name the elements of 3d transition series that show maximum number of oxidation states. Why does this happen?

(ii) Which transition metal of 3d series has positive  $E^\circ (M^{2+}/M)$  value and why?

(iii) Out of  $Cr^{3+}$  and  $Mn^{3+}$ , which is a stronger oxidising agent and why?

(iv) Name a member of the lanthanoid series that is well-known to exhibit +2 oxidation state.

(v) Complete the following equation:



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**Q.No.11:** What are the transition elements? Write two characteristics of the transition elements.

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**Q.No.12:** (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 :



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