

The d- and f-Block Elements

1. The colour of KMnO_4 solution is decolourised by Fe^{2+} solution, one mole of Fe^{2+} reacts with x moles of KMnO_4 .
2. Use Hund's rule to derive the electronic configuration of Ce^{3+} ion, and calculate its magnetic moment on the basis of 'spin-only' formula.
3. A compound of a metal ion M^{x+} ($Z = 24$) has a spin only magnetic moment of $\sqrt{15}$ Bohr Magnetons. Find the number of unpaired electrons in the compound.
4. What are the number of ions formed on dissolving one molecule of $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ (Mohr's salt)?
5. In an alkaline condition KMnO_4 reacts as follows:
$$2\text{KMnO}_4 + 2\text{KOH} \rightarrow 2\text{K}_2\text{MnO}_4 + \text{H}_2\text{O} + \text{O}$$
Calculate its equivalent weight.
6. Titanium shows magnetic moment of 1.73 B.M. in its compound. What is the oxidation number of Ti in the compound?
7. Four successive members of the first series of the transition metals are listed below. How many of them have the standard potential $\left(E_{\text{M}^{2+}/\text{M}}^\circ\right)$ value with positive sign?
(I) Co ($Z = 27$) (II) Ni ($Z = 28$)
(III) Cu ($Z = 29$) (IV) Fe ($Z = 26$)
8. What is the approximate percentage of iron in mischmetal?
9. The standard redox potentials for the reactions $\text{Mn}^{2+} + 2\text{e}^- \rightarrow \text{Mn}$ and $\text{Mn}^{3+} + \text{e}^- \rightarrow \text{Mn}^{2+}$ are -1.18 V and 1.51 V respectively. What is the redox potential for the reaction $\text{Mn}^{3+} + 3\text{e}^- \rightarrow \text{Mn}$?
10. $\text{CrO}_4^{2-} \xrightarrow{\text{pH} = x} \text{CrO}_7^{2-} \xrightarrow{\text{pH} = y} \text{CrO}_4^{2-}$. Find the sum of x and y .
11. 12 grams of silver was extracted from a sample of an ore from which the only source of silver was Ag_2S . How many grams of Ag_2S were in the original sample?
12. What is the oxidation number of Mn in the product of alkaline oxidative fusion of MnO_2 .
13. Out of the following, how many oxides are acidic.
 MnO , Mn_2O_3 , MnO_2 , MnO_3 , Mn_2O_7
14. How many of the transition elements are called platinum metals?
15. A light blue coloured compound (A) on heating gives a black compound (B) which reacts with glucose to give a red compound (C). After the completion of reaction, how many metal oxides are formed?

