Assignment

Chapter 8: d -and f -Block Elements

1. Describe the general characteristics of transition elements with special reference to the following :
   (i) Variable oxidation states
   (ii) Complex formations.
   (iii) Formations of coloured ions.

2. (i) What are interstitial compounds? Why are such compounds well known for transition elements?
   (ii) What are alloys? Name an alloy which contains a lanthanoid metal.

3. How is it that several transition metals act as catalysts? Give two examples of reactions catalyzed by them?

4. What is the effect of increasing the pH on a solution of potassium dichromate?

5. Complete the following reactions:
   $Cr_2O_7^{2-}(aq.) + I^-(aq.) + H^+ \longrightarrow$
   $MnO_4^-(aq.) + Fe^{2+}(aq.) + H^+(aq.) \longrightarrow$
   $MnO_4^-(aq.) + S_2O_3^{2-}(aq.) + H_2O(l) \longrightarrow$
   $C_2O_4^{2-}(aq.) + MnO_4^-(aq.) + H^+(aq.) \longrightarrow$
   $Cr_2O_7^{2-}(aq.) + H_2S(g) + H^+(aq.) \longrightarrow$
   $Cr_2O_7^{2-}(aq.) + Fe^{2+}(aq.) + H^+(aq.) \longrightarrow$
   $MnO_2(s) + KOH(aq.) + O_2 \longrightarrow$
   $2CrO_4^{2-} + 2H^+ \longrightarrow$

6. Compare the chemistry of actinoids with that of lanthanoids with reference to
   (i) electronic configuration (ii) oxidation state
   (iii) atomic sizes (iv) chemical reactivity

7. Write the steps involved in the preparation of:
   (i) $K_2Cr_2O_7$ from Chromite ore
   (ii) $KMnO_4$ from pyrolusite ore

8. What may be the possible oxidation states of the transition metals with the following d electronic configurations in the ground state of their atoms:
   $3d^34s^2$, $3d^54s^2$ and $3d^64s^2$. Indicate relative stability of oxidation states in each case.

9. Calculate the number of unpaired electrons in following gaseous ions: Mn^{3+}, Cr^{3+}, V^{3+} and Ti^{3+}. Which one of these is the most stable in aqueous solution?

10. How would you account for the following:
    (a) The metallic radii of the third(5d) series of transition metals are virtually the same as those of corresponding group members of the second (4d) series.

(b) Among lanthanoids, Ln(III) compounds are predominant. However, occasionally in solutions orin solid compounds,+2 and+4 ions are also obtained.
(c) The EoM2+/M for copper is positive (0.34V), copper is the only metal in the first series of transition elements showing this behavior.
(d) The higher oxidation states are usually exhibited by the members in the middle of the series of transition elements.
(e) The metal-metal bonding is more frequently found with the second and third series of transition elements.

11. 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 solution and why?
Sc^{3+}, V^{3+}, Ti^{4+} , Mn^{2+}

12. In a terrorist activity in the Mumbai nearly ten persons were killed and 50 injured due to continuous showering of bullets on them by terrorists. A group of persons rushed to the spot immediately and helped the injured to reach the nearby hospital.
(i) Which kind of value is reflected by these persons by doing this?
(ii) Which alloy is used in the preparation of bullet?

13. It is a general belief that we should not come out of the house to see "Solar Eclipse" because it can have evil impact on life but nowadays educated people allow their children to see solar eclipse, treating it as a natural science phenomenon, but children are advised to see them by U.V. protected sun glasses (crooke's lenses) to avoid harmful impact of UV light on eyes.
(i) Write the name of transition metal oxide used in making U.V protected lens.
(ii) By allowing the children to see solar eclipse using U.V. protected lens which value the educated people trying to inculcate in the children.
(iii) Which rays are present in the light which can damage the eye while viewing solar eclipse with naked eye?