



Name :

Time : 6 hr

Total Marks = 66

Date: 23/10/2017

- Q1. (a) Explain the following** **3**
- (i) Transition elements tend to be unreactive with increasing atomic number in the series.
 - (ii) *d*-block elements exhibit more oxidation states than *f*-block elements.
- (b) A green chromium compound (A) on fusion with alkali gives a yellow compound (B) which on acidification gives an orange coloured compound (C). 'C' on treatment with NH_4Cl gives an orange coloured product (D), which on heating decomposes to give back (A). Identify A, B, C and D. Write equations for reactions.
- Q2. (a) Give balanced chemical equations of two reactions in which KMnO_4 acts as an oxidising agent in the acidic medium.** **3**
- (b) Give reasons:
- (i) Cr^{2+} is a strong reducing agent whereas Mn^{2+} is not. [Cr = 24, Mn = 25]
 - (ii) The transition metal ions such as Cu^+ , Ag^+ and Sc^{3+} are colourless.
 - (iii) Chemistry of the actinoids is much more complicated than that of the lanthanoids.
- Q3. Compare the chemistry of actinoids with that of the lanthanoids with special reference to :** **3**
- (a) Electronic configuration (b) Oxidation state (c) Atomic and ionic sizes
- Q4. Explain the following properties of transition elements** **3**
- (a) metallic character, (b) ionization energies.
- Q5. What happens when?** **3**
- (a) Silver chloride is treated with aqueous sodium cyanide and the product thus formed is allowed to react with zinc in alkaline medium.
 - (b) Zinc oxide is treated with excess of sodium hydroxide solution.
 - (c) Ammonium thiocyanate is added to ferric chloride solution.
- Q6. Explain the following:** **3**
- (a) A dark blue precipitate is formed when sodium hydroxide solution is added to copper sulphate solution. The precipitate darkens on heating.
 - (b) Cuprous chloride is insoluble in water and dilute HCl but dissolves in concentrated HCl.
 - (c) CuS is not precipitated by passing H_2S through copper sulphate solution containing KCN.
 - (d) Silver nitrate solution is kept in dark coloured bottles.
- Q7. Explain:** **3**
- (a) Why are Sm^{2+} , Eu^{2+} and Yb^{2+} good reducing agents?
 - (b) Can lanthanum ($Z = 57$) exhibit +4 oxidation state?
 - (c) Why are +3 oxidation state of gadolinium ($Z = 64$) and lutetium ($Z = 91$) especially stable?
 - (d) Why do Zr and Hf exhibit similar properties?

- Q8. What is the equivalent mass of KMnO_4 when it acts as an oxidising agent in acidic medium (molecular mass $\text{KMnO}_4 = 158$)? 3
- Q9. Explain the following giving suitable reason: 3
- Yellow coloured aqueous solution of sodium chromate changes to orange red when CO_2 under pressure is passed.
 - Green solution of potassium manganate, K_2MnO_4 , turns purple when CO_2 is circulated.
- Q10. Assign reason for each of the following: 3
- Ce^{3+} can be easily oxidised to Ce^{4+} .
 - E° for $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is more positive than for $\text{Fe}^{3+}/\text{Fe}^{2+}$ couple.
 - $\text{Lu}(\text{OH})_3$ is a weaker base than $\text{La}(\text{OH})_3$.
- Q11. (a) Chromium is a typical hard metal while mercury is a liquid. Explain. 3
- The melting and boiling points of Zn, Cd and Hg are low. Why?
 - Though copper, silver and gold have completely filled sets of d -orbitals, yet they are considered as transition metals. Why?
- Q12. Give chemical reaction of Lanthanides with water, nitrogen sulphur, oxygen or hydrochloric acid. 3
- Q13. Answer the following; 5
- Which one of Fe^{2+} and Fe^{3+} ions is more paramagnetic and why?
 - Which of the following ions are expected to be coloured and why?
 $\text{Cu}^+, \text{Fe}^{2+}, \text{Mn}^{2+}, \text{Cr}^{3+}, \text{Sc}^{3+}, \text{Ti}^{4+}$
 - Name the two elements of first transition series which have abnormal electronic configuration and why?
 - Name the lightest and heaviest elements in terms of density among the transition elements.
 - How many elements are present in each transition series? Why this number cannot be less or more?
- Q14. What happens when? 5
- Ferric chloride is added to potassium ferrocyanide.
 - Iron reacts with cold dilute nitric acid.
 - Potassium ferricyanide is added to ferrous sulphate.
 - Excess of potassium iodide is added to mercuric chloride.
 - Green vitriol is strongly heated.
- Q15. Explain the following: 5
- Magnesium oxide is used for lining of steel making furnace.
 - Cast iron is hard but pure iron is soft in nature.
 - Fe^{3+} is more stable than Fe^{2+} .
 - Anhydrous FeCl_3 cannot be obtained by heating hydrated ferric chloride.
 - The compounds of iron are coloured and paramagnetic.

Q16. Explain the following:

5

- (a) Mercuric chloride is called corrosive sublimate.
- (b) The colour of mercurous chloride changes from white to black when treated with ammonia solution.
- (c) Excess of carbon is added in the zinc metallurgy.
- (d) Zinc readily liberates hydrogen from cold dilute H_2SO_4 but not from cold concentrated H_2SO_4 .
- (e) The compounds of Zn, Cd and Hg are usually white.

Q17. Explain the following:

5

- (a) Copper (I) salts are not known in aqueous solutions.
- (b) Ferric iodide is very unstable but ferric chloride is not.
- (c) Silver bromide is used in photography.
- (d) Anode mud in copper refining contains silver and gold.
- (e) Silver fluoride is fairly soluble in water while other silver halides are insoluble,

Q18. Explain the following:

5

- (a) Copper is regarded as transition metal though it has completely filled d -orbital (d^{10}).
- (b) Of cobalt and zinc salts, which is attracted in a magnetic field?
- (c) The species $[\text{CuCl}_4]^{2-}$ exist but $[\text{CuI}_4]^{2-}$ does not.
- (d) Copper is largely used in electrical wiring.
- (e) A solution of K_2CO_3 changes colour on being acidified.