QB365

Important Questions - The d- and f- Block Elements

12th Standard CBSE

Chemistry Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

1) Generally transition elements form coloured salts due to the presence of unpaired electrons. Which of the following compounds will be coloured in solid state ? **1**

(a) Ag_2SO_4 (b) CuF_2 (c) ZnF_2 (d) Cu_2Cl_2

2) Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium ? **1**

(a) $[Xe]4f^7 5d^1 6s^2$ (b) $[Xe]4f^6 5d^2 6s^2$ (c) $[Xe]4f^8 6s^2$ (d) $[Xe]4f^9 5s^1$

3) Which one of the following ions is the most stable in aqueous solution ? **1**

(a) Mn^{2+} (b) Cr^{3+} (c) V^{3+} (d) Ti^{3+}

4) Which one of the following does not correctly represent the correct order of the property indicated against it ? **1**

(a) Ti<V<Cr<Mn : increasing melting points (b) Ti<V<Mn<Cr : increasing 2nd ionization enthalpy

(c) Ti<V<Cr<Mn : increasing number of oxidation states

(d) $Ti^{3+}<V^{3+}<Cr^{3+}<Mn^{3+}$: increasing magnetic moment

5) MnO_4^- reacts with Br^- in alkaline pH to give. **1**

(a) BrO_3^-, MnO_2 (b) Br_2, MnO_4^{2-} (c) Br_2, MnO_2 (d) BrO^-, MnO_4^{2-}

6) Potassium manganate (K_2MnO_4) is formed when **1**

(a) Chlorine is passed through aqueous $KMnO_4$ solution.

(b) Manganese dioxide is fused with potassium hydroxide in air

(c) Formaldehyde reacts with potassium permanganate in presence of strong alkali.

(d) Potassium permanganate reacts with H_2SO_4.

7) When pyrolusite id fused with KOH and $KClO_3$, we get **1**

(a) $KMnO_4$ (b) K_2MnO_4 (c) Both $KMnO_4$ and K_2MnO_4 (d) None of these

8) Complete and balance the following chemical equation: $Cr_2O_7^{2-} + I^- + H^+ \longrightarrow$ **1**

9) $[Ti(H_2O)_6]^{3+}$ complex ion has purple colour due to absorption of ..... coloured light and causing transition from ..... to ..... orbitals **1**

10) Philospher's wool is the name given to the compound **1**

Section - B

11) What is misch metal? Mention its two important uses. **2**

12) Which is the last element in the series of the actinoids? Write the electronic configuration of this element. Comment on the possible oxidation state of this element. **2**

13) Although Cr^{3+} and Co^{2+} ions have same number of unpaired electrons but the magnetic moment of Cr^{3+} is 3.87 B.M. and that of $Co^{2+}$is 4.87 B.M. Why? **2**

14) Explain why transition elements have irregularities in their electronic configuration. **2**

15) Atomic radius of Cu is greater than that of Cr but ionic radius of Cr^{2+} is greater than that of Cu^{2+} . Give suitable explanation. **2**

16) Give reasons for the following : Variations in the radii of transition elements are not as pronounced as those of representative elements. **2**

17) In what way do the d - block metals differ from alkali and alkaline earth metals ? **2**

18) Complete the following reactions: (a) $Cr_2O_7^{2-}+14H^++6e^- \longrightarrow$..... $+7H_2O$ (b) $CrO_4^{2-}+$.....$\rightleftharpoons$.....$\rightleftharpoons$.....$+H_2O$ **2**

(c) $MnO_4^-+2H_2O+3e^- \xrightarrow{medium}$..... $+4OH^-$

19) Indicate the steps in the preparation of: (a) $K_2Cr_2O_7$ from chromite ore. (b) $KMnO_4$ from pyrolusite ore. **2**

20) When an oxide of manganese (A) is fused with KOH in the presence of an oxidising agent and dissolved in water, it gives a Compound (B) disproportionates in neutral or acidic solution to give purple compound (C). An alkaline solution of compound (C) oxidises potassium iodide solution to a compound (D) and compound (A) is also formed. Identify compound A to D and also explain the reactions involved. **2**

Section - C

21) (a) Given below are the electrode potential values, E^o for the some of the first row of transition elements: **5**

Element	$E^o_{M^{2+}/M}$ (V)
V(23) Cr(24) Mn(25) Fe(26) Co(27) Ni(28) Cu(29)	-1.18 -0.91 -1.18 -0.44 -0.28 -0.25 +0.34

Explain the irregularities in these values on the basis of electronic structures of atoms. (b) Complete the following reaction equations: (i) $Cr_2O_7^{2-}+Sn^{2+}+H^+ \longrightarrow$ (ii) $MnO_4^-+Fe^{2+}+H^+ \longrightarrow$

22) Compare the general characteristics of the first series of the transition metals with those of the second and third columns. Give special emphasis on the following points: (i) electronic configurations, (ii) oxidation states, (iii) ionisation enthalpies and (iv) atomic sizes. **5**

23) (a) Complete the following chemical equations : $(i) \quad Cr_2O_7^{2-}(aq) + H_2S(g) + H^+(aq) \longrightarrow$ (b) How would **5**

$(ii) \quad Cu^{2+}(aq) + I^-(aq) \longrightarrow$

you account for the following ? (i) The oxidizing power of oxoanions is the order : $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

(ii) The third ionization enthalpy of manganese (Z = 25) is exceptionally high. (iii) Cr^{2+} is stronger reducing agent than Fe^{2+}

24) (i) Name the element of 3d transition series which shows maximum number of oxidation states. Why does it show so? **5**

(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 oxidizing agent and why?

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

(v) Complete the following equation: $MnO_4^- 8H^+ 5e^- \longrightarrow$

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