Std : XII

4. Transition and inner transition elements

Time : 2Hrs Section - I Answer all the questions. Q. type : ABC

$20 \times 1 = 20$ Marks : 60

1. The correct electronic configuration of chromium (Atomic number 24) is

(a) $[Ar]\ 3d^4, 4s^2$ (b) $[Ar]\ 3d^5\ 4s^1$ (c) $[Ar]\ 3d^9, 4s^2$ (d) $[Ar]\ 3d^{10}, 4s^1$

2. Which one of the following has the same number of unpaired electrons as present in V^{3+} ?

(a) Ti^{3+} (b) Fe^{3+} (c) Ni^{2+} (d) Zn^{2+}

3. The catalytic behaviour of transition metals and their compounds is due to

(a) their magnetic behaviour (b) their unfilled 'd' orbitals

(c) their ability to adopt variable oxidation states L.C

(d) their chemical reactivity.

4. The correct order of increasing oxidising power is

(a) $VO_2^+ < MnO_4^- < Cr_2O_7^{2-}$ (b) $MnO_4^- < Cr_2O_7^{2-} < VO_2^+$

(c) $Cr_2O_7^{2-} < VO_2^+ < MnO_4^-$ (d) $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

5. In acid medium permanganate ion changes to ___ and in neutral or basic medium it changes to ___ respectively

(a) MnO_4^{2-} and Mn^{2+} (b) Mn^{2+} & Mn^{3+} (c) Mn^{3+} & MnO_4^{2-}

(d) Mn^{2+} and MnO_2.

6. The no. of moles of I_2 liberated when 1 mole of $K_2Cr_2O_7$ react with KI in acid medium is

(a) 3 (b) 2 (c) 5 (d) 4

7. Regarding lanthanons which is incorrect?

(a) Europium shows +2 oxidation state

(b) The basicity nature of the hydroxides decreases from Ce to Lu.

(c) Ce^{4+} ions are wild used as oxidising agents in volumetric analysis.

(d) All the lanthanons are much more reactive than aluminium.

8. The ~~most~~ common oxidation state of lanthanoids

(a) +3 (b) +2 (c) +4 (d) +5

9. The actinoids which show the highest oxidation state of +7 are

(a) U, Fm, Th (b) U, Np, Pu (c) Np, Pu, Am

(d) Np, Am, Th

10. Consider the following statements.

(i) Lanthanum is actually an element of transition metal series rather than lanthanide series.

(ii) Ce^{4+} is used as an oxidising agent since it has a tendency of attaining +3 oxidation state.

(iii) Zr & Hf have the same atomic radii because of lanthanide contraction.

(iv) Lanthanides belong to Group-6 and Period-3.

Which of the above statements are correct?

(a) (i), (ii) & (iv) (b) (i), (ii) & iv) (c) (i) (ii) & (iii)

(d) (i) & ~~(iii)~~ (iii).

L.C

11. Match the following

A) Titanium	1) light bulb filaments.
B) Tungsten.	2) Catalyst.
c) Molybdenum	3) Artificial joints
D) Platinum	4) boiler plants

	A	B	C	D
~~(a)~~ (a)	3	1	4	2
(b)	2	4	3	1
(c)	3	4	2	1
(d)	4	3	1	2

12. Among the first transition metals which has the lowest melting point?
(a) Mn (b) Zn (c) Cr (d) Sc.

13. Which among the following statements is incorrect?
(a) In the first transition series Mn has the highest oxidation state of +7.
(b) The oxidation state of nickel in $[Ni(CO)_4]$ is four
(c) Ru & Os have +8 as the maximum oxidation state. (L.C)
(d) Among the first transition series Sc and Zn do not have variable oxidation states.

14. For which of the following metal E° for $M^{2+} + 2e^- \rightarrow M$ is more negative?
(a) Zn (b) Mn (c) Ti (d) Cu.

15. Which d-block metal ion shows the maximum magnetic moment?
(a) Mn^{2+} (b) Cr^{2+} (c) Cu (d) Mn^{4+}

16. Which among the following oxides is ionic and basic in nature?
(a) Mn_2O_7 (b) CrO (c) Cr_2O_3 (d) CrO_3

17. The general electronic configuration of lanthanides is
(a) $[Xe]\ 4f^{2-14}\ 6s^2$ (b) $[Xe]\ 4f^{1-14}\ 5d^1\ 6s^2$
(c) $[Xe]\ 4f^{1-14}\ 6s^2$ (d) $[Xe]\ 4f^{1-14}\ 5d^{0-2}\ 6s^2$

18. Which of the following compounds is colourless?
(a) Fe^{3+} (b) Co^{2+} (c) Ti^{3+} (d) Zn^{2+}

19. Zeigler - Natta catalyst is
(a) Rh/Ir complex (b) $TiCl_2 + Al(C_2H_5)_4$
(c) $TiCl_4 + (C_2H_5)_3Al$ (d) $TiCl_3 + (C_2H_5)_4Al$.

20. Regarding interestitial compounds of d-block elements which is incorrect?
(a) they are hard and show electrical and thermal conductivity
(b) They have low melting points than those of pure metals.
(c) Transition metal hydrides are powerful reducing agents.
(d) Metallic carbides are chemically inert (L.C)

Section - II Answer any ten questions and question numbers 23 & 30 are compulsory. 10×2=20

21. What are transition metals? Write their general electronic configuration. Give 2 examples.
22. What are actinides? Give three examples.
23. Why d-block elements exhibit variable oxidation states?
24. Why d-block elements form alloys. Write the conditions for alloy formation.
25 Why d-block elements and their compounds are used as catalysts?
26. Justify the position of lanthanides and actinides in the periodic table.
27. Which is a stronger reducing agent Cr^{2+} or Fe^{2+}? Why?
28. Transition metals show high melting points. Why?

29) Compare the ~~first~~ ionisation enthalpies of first series of the transition elements.

30) What is lanthanide contraction and why is it caused?

31) Explain the oxidising nature of $K_2Cr_2O_7$ by giving 2 examples.

32) Why d-block elements form complexes?

33) What is the action of heat on
i) $K_2Cr_2O_7$ (ii) $KMnO_4$?

34) Draw the structures of CrO_4^{2-} and $Cr_2O_7^{2-}$ ions.

L.C

35) HCl, ~~and~~ HNO_3 can not used for making $KMnO_4$ acidic while it acts as oxidising agent?

36) What are the consequences of lanthanoid contraction?

37) Write any two uses of each of the ~~following~~ i) $KMnO_4$ (ii) $K_2Cr_2O_7$.

Section- III

Answer ~~any~~ five the questions. $5 \times 3 = 15$.

38) Compare the properties of lanthanoids with those of actinoids.

39) i) How is $KMnO_4$ prepared from pyrolusite ore?
(ii) Calculate the equivalent mass of $KMnO_4$ in acid medium.

40) i) How is potassium dichromate prepared from chromite ore?
(ii) Among ~~Chromite~~ CrO_4^{2-} and $Cr_2O_7^{2-}$ ions which exists in acid medium and which exists in alkaline medium?

41) i) Explain chromyl chloride test with equations

(ii) Why Eu^{2+} is more stable than Ce^{2+}?.

42) i) Explain the variation in $E^{\circ}_{M^{3+}/M^{2+}}$ for 3d series.

(ii) Calculate the number of unpaired electrons in Ti^{3+} and calculate its spin only magnetic moment?.

43. Give reasons

i) Cu^{2+} salts are coloured but Zn^{2+} salts are colourless.

(ii) Mn^{2+} is more stable than Mn^{3+}. Why?

(iii) $Cr^{3+} + e^- \rightarrow Cr^{2+}$ $E^{\circ} = -0.41V$. Among Cr^{2+} and Cr^{3+} which is more stable? Why?

Section-II Answer the following question. $1 \times 5 = 5$

44. a) Write the basic equation for the oxidising behaviour of MnO_4^- ion i) in acid medium (ii) neutral medium.

b) Complete and balance the following equations.

i) $MnO_4^- + Fe^{2+} + H^+ \longrightarrow ?$

(ii) $MnO_4^- + H_2S \rightarrow ?$ (neutral medium)

(iii) $MnO_4^- + SO_4^{2-} + H^+ \rightarrow ?$.

(c) What is Baeyer's reagent? Give its use.

— x — x — All the best — L.C — x —