Test

d & f-Block

Q1 Electronic configuration of a transition element X in +3 oxidation state is $[Ar]3d^5$ What is its atomic number?

a) 25
b) 26
c) 27
d) 24

Q2 Generally transition elements form coloured salts due to the presence of unpaired electrons. Which of the following compounds will be coloured in solid state?

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

Q3 When $KMnO_4$ solution is added to oxalic acid solution, the decolourisation is slow in the beginning but becomes instantaneous after some time because

a) CO_2 is formed as the product.
b) Reaction is exothermic.
c) MnO_4^{-1} Catalyses the reaction.
d) Mn^{2+} acts as auto-catalyst.

Q4 The magnetic moment is associated with its spin angular momentum and orbital angular momentum. Spin only magnetic moment value of Cr^{3+} ion is _____.

a) 2.87 B.M.
b) 3.87 B.M.
c) 3.47 B.M.
d) 3.57 B.M.

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
c) Assertion is correct, but reason is wrong statement.
d) Assertion is wrong but reason is correct statement.
e) Both assertion and reason are wrong statements

Q5 Assertion:
Separation of Zr and Hf is difficult.
Reason:
Because Zr and Hf lie in the same group of the periodic table.

Q6 Assertion:
Actinoids form relatively less stable complexes as compared to lanthanoids.
Reason:

Actinoids can utilise their 5*f* orbitals along with 6*d* orbitals in bonding but lanthanoids do not use their 4*f* orbital for bonding.

Q7 Transition metals are much harder than the alkali metals. Why?

Q8 How would you account for the following? Many of the transition elements are known to form interstitial compounds?

Q9 Cr^{2+} is a strong reducing agent whereas Mn^{3+} with the same (d^4) configuration is an oxidizing agent. Give reason.

Q10 Account for the following:

a) Mn^{+2} is more stable than Fe^{+2} towards oxidation to + 3 state.

b) The enthalpy of atomization is lowest for Zn in first series (3d) of the transition elements.

Q11 Account for the following :

a) Cu^{+1} is unstable in an aqueous solution.

b) Transition metals form complex compounds.

c) Complete the following equation:

$$Cr_2O_7^{-2} + H_2S + H^+ \rightarrow$$

Q12 Account for the following :

a) The enthalpies of atomization of the transition metals are high.

b) The lowest oxide of a transition metal is basic, the highest is amphoteric or acidic.

c) Cobalt (II) is stable in aqueous solution but in the presence of complexing agents, it is easily oxidized.

Q13 The elements of *3d* transition series are given as: Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn Answer the following:

a) Write the element which shows maximum number of oxidation states. Give reason.

b) Which element has the highest melting point?

c) Which element shows only + 3 oxidation state?

d) Which element is a strong oxidizing agent in + 3 oxidation state and why?

Q14 Do as directed

a) How does the acidified potassium permanganate solution react with (a) iron (II) ions and (b) oxalic acid? Write the ionic equations for the reactions.

b) Name the oxo metal anion of one of the transition metals in which the metal exhibits the oxidation state equal to the group number.

c) Account for the following:

i) Scandium (Z = 21) is regarded as a transition element but zinc (Z = 30) is not.

ii) $E_{M^{+2}/M_{(s)}}$ value for copper is positive.