



**INDIAN SCHOOL DARSAIT**  
**DEPARTMENT OF CHEMISTRY**



Subject: Chemistry    Topic : d and f Block Elements		Date of Worksheet: 5.12.2018
Resource Person: SREEKALA M		Date of Submission: _____
Name of the Student: _____ Class & Division: XII		Roll Number: _____
1.	Compare the relative stability of +2 oxidation states in aqueous solutions of the metals having in their atoms the outer electron configurations, $3d^3 4s^2$ , $3d^6 4s^2$ and $3d^5 4s^2$	1
2.	How many unpaired electrons are present in $Mn^{2+}$ ion? (At. No. of Mn =25). How does it influence magnetic behavior of $Mn^{2+}$ ions?	1
3.	Out of $Ag_2SO_4$ , $CuF_2$ , $MgF_2$ , and $CuCl$ , which compound will be coloured and why?	1
4.	What is Misch metal ? Mention two of its important uses.	1
5.	Calculate the spin only magnetic moment of $M^{2+}$ ion. (Z=27)	1
6.	Complete the following chemical equations.. i) $Cr_2O_7^{2-} + H^+ + Fe^{2+} \rightarrow$ ii) $MnO_4^- + I^- + H^+ \rightarrow$ iii) $Cr_2O_7^{2-} (aq) + C_2O_4^{2-} (aq) + H^+ (aq) \rightarrow$ iv) $MnO_4^- (aq) + Fe^{2+} (aq) + H^+ (aq) \rightarrow$ v) $Cr_2O_7^{2-} (aq) + H_2S + H^+ (aq) \rightarrow$ vi) $CrO_4^{2-} + H^+ \rightarrow$ heat vii) $KMnO_4 \xrightarrow{\hspace{2cm}}$ viii) $Cr_2O_7^{2-} + OH^- \rightarrow$ ix) $MnO_4^- + H_2O + I^- \rightarrow$	1 each
7.	Describe the preparation of i) Potassium dichromate from sodium chromate ii) $KMnO_4$ from $K_2MnO_4$	2
8.	What is lanthanoid contraction? State the cause and two consequences of lanthanoid contraction.	2

9.	Transition metal can act as catalyst because these can change their oxidation state. How does Fe(III) catalyse the reaction between iodide and persulphate ions?	2
10.	Write chemical equations for the following reactions. i)Oxidation of nitrite ion by $\text{MnO}_4^-$ in acidic medium. ii)Acidification of potassium chromate solution. iii)Disproportionation of manganese(VI) in acidic solution.	3
11.	A mixed oxide of iron and Chromium is fused with sodium carbonate in the presence of air to form a coloured compound A. On acidification the compound (A) forms an orange coloured compound (B), which is a strong oxidizing agent. Identify i)the compounds(A) and (B) ii)Write balanced chemical equation for each step	3
12.	Give reasons: i) $E^0$ value for $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than that for $\text{Fe}^{3+}/\text{Fe}^{2+}$ ii) Iron has higher enthalpy of atomization than that of copper. iii) $\text{Sc}^{3+}$ is colourless in aqueous solution whereas $\text{Ti}^{3+}$ is coloured.	3
13.	Compare actinoids and lanthanoids with reference to their i) Electronic configuration of atoms ii) Oxidation states of elements iii) General chemical reactivity of elements.	3
14.	a)Which is stronger reducing agent $\text{Cr}^{2+}$ or $\text{Fe}^{2+}$ and why? b)Describe the oxidizing property of $\text{KMnO}_4$ in neutral or faintly alkaline medium for its reaction with iodide ions and thiosulphate ions.	5
15.	a)A blackish brown coloured solid 'A' when fused with alkali metal hydroxides in the presence of air, produces a dark green coloured compound 'B' which on electrolytic oxidation in alkaline medium gives a dark purple coloured compound C. Identify A,B,C and write the reactions involved.  b) What happens when an acidic solution of the green compound (B) is allowed to stand for some time? Give the equation involved. What is this type of reaction called?	5

### Account for the following:

1.	The transition elements have great tendency for complex formation
2.	There is a gradual decrease in the atomic sizes of transition elements in a series with increasing atomic numbers.
3.	Lanthanum and Lutetium do not show colouration in solutions.
4.	The enthalpies of atomization of transition elements are quite high.
5.	There is a greater horizontal similarity in the properties of the transition elements than of the main group elements.
6.	Transition metals acts as catalyst
7.	Chromium group elements have the highest melting points in their respective series.
8.	Transition metals form coloured complexes.
9.	With the same d-orbital configuration ( $d^4$ ) $\text{Cr}^{2+}$ ion is a reducing agent while $\text{Mn}^{3+}$ ion is an oxidizing agent.
10.	$\text{Cu}^+$ ion is not stable in aqueous solution.
11.	Among the 3d series of transition elements, the largest number of oxidation states are exhibited by manganese.
12.	Metal-metal bonding is more extensive in the 4d and 5d series of transition elements than the 3d series.
13.	$\text{Mn(III)}$ undergoes disproportionation reaction easily.
14.	$\text{Co(II)}$ is easily oxidized in the presence of strong ligands.
15.	Zr and Hf have identical sizes.
16.	The lowest oxidation state of manganese is basic while the highest is acidic.
17.	$\text{Mn(II)}$ shows maximum paramagnetic character amongst the divalent ions of the first transition series.
18.	$\text{Ce}^{4+}$ is a strong oxidizing agent
19.	Oxidising power in the series $\text{VO}^{2+} < \text{Cr}_2\text{O}_7^{2-} < \text{MnO}_4^-$
20.	Actinoid contraction is greater from element to element than lanthanoid contraction.
21.	Oxoanions of a metal show higher oxidation state.
22.	Europium(II) is more stable than Cerium(II)
23.	In the titration of $\text{FeSO}_4$ with $\text{KMnO}_4$ , in the acidic medium, why dil $\text{H}_2\text{SO}_4$ used instead of $\text{HCl}$ .
24.	Among transition metals, the highest oxidation state is exhibited in oxoanions of a metal.
25.	Transition metals form a number of interstitial compounds.
26.	$\text{Zn}^{2+}$ salts are white while $\text{Cu}^{2+}$ salts are blue.
27.	Transition metals have high enthalpies of atomization.
28.	Among the lanthanoids, $\text{Ce(III)}$ is easily oxidized to $\text{Ce(IV)}$ .
29.	$\text{Fe}^{3+}/\text{Fe}^{2+}$ redox couple has less positive electrode potential than $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple.
30.	Copper (I) has $d^{10}$ configuration, while $\text{Cu(II)}$ has $d^9$ configuration, still $\text{Cu(II)}$ is more stable in aqueous solution than $\text{Cu(I)}$ .
31.	The second and third transition series elements have almost similar atomic radii.
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