Self Practice Paper (SPP)

1.	The maximum oxidatio (1) + 5 , + 6 , + 3 , + 3 (3) + 5, + 3 , + 2 , + 1	n state shown by V(Z = 2	23), Cr(Z = 24), Co(Z = 2 (2) + 3 , + 4 , + 5, + 2 (4) + 4 in each case.	7), Sc(Z = 21) are respectively :		
2.	Which oxide of manga (1) MnO	nese is most acidic in nat (2) Mn ₂ O ₇	ture ? (3) Mn ₂ O ₃	(4) MnO ₂ .		
3.	The first ionisation ene (1) generally increases (2) decrease as the ato (3) do not show any ch (4) increase from Ti to	rgies of the elements of the as the atomic numbers is omic number increase. I ange as the addition of emission of the addition of emission of the addition of the matching and then decrease from the section and the section as the section and the section as the section and the section and the section as the section and the section as the s	the first transition series : increase. electrons takes place in the inner (n – 1) d–orbitals. from Mn to Cu.			
4.	The ions from among t (i) Ti ⁴⁺ , (ii) Cu ⁴ (1) (i) and (ii) only	he following which are co ⁺¹ , (iii) Co ³⁺ , (2) (i), (ii) and (iii)	blourless are : (iv) Fe²+ . (3) (iii) and (iv)	(4) (ii) and (iii).		
5.	Which of the following (1) Co ³⁺	transition metal ions has (2) Fe ³⁺	least magnetic moment (3) Cr ²⁺	? (4) V ³⁺		
6.	If a non metal is added (1) softer	to the interstitial sites of (2) less tensile	a metal, then the metal (3) less malleable	becomes : (4) more ductile.		
7.	The pair of the compound (1) [Fe(CN) ₆] ^{3–} , [Co(CN (3) TiO ₂ , MnO ₂)	unds in which both the mo $[\mathbf{V}]_6]^{3-}$	netals are in the highest possible oxidation state is, (2) CrO_2Cl_2 , MnO_4^- . (4) $[\text{Co}(\text{CN})_6]^{3-}$, Mn_2O_7 .			
8.	Solution of CuCl in NH (1) N ₂	₃ .H ₂ O does not absorb : (2) SO ₂	(3) C ₂ H ₂	(4) CO		
9.	A compound of iron ex giving brown acidic sol (1) Fe ₂ O ₄	ists as a dimer in vapour ution. The compound is : (2) FeSO,	r state. It is hygroscopic (3) FeCl	in nature and dissolves in water (4) FeCl ₂ .		
10.	 Select the correct statement(s) regarding oxides of copper: (1) CuO is black & Cu₂O is white in colour. (2) Commercially, CuO is obtained by calcination of haematite ore. (3) Hydrated cupric chloride upon strong heating produces CuO as one of the product. (4) Upon partial roasting of chalcopyrites ore in metallurgy, Cu₂O is obtained as one of the product. 					
11.	 Select the correct statements : (1) CuCl₂.2H₂O is a green crystalline solid. (2) Blue vitriol is used for making Fehling's solution & Bordeause mixture. (3) Anhydrous CuCl₂ is dark brown solid. (4) All of these 					
12.	2CuSO ₄ + 2NaCl + SO	$P_2 + 2H_2O \longrightarrow Compour$	$Md + Na_2SO_4 + 2H_2SO_4$			
	Compound X gradually Correct statement abo	turns green on exposure ut compound X is :	e in air due to oxidation.			
	(1) Compound X is Cu	₂ Cl ₂	(2) Compound X forms	black ppt with H ₂ S		

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	(3) Compound X is sol	uble in aq. NH ₃ solution	(4) All of these				
13.	Which of the following are correct ? (1) Anhydrous ferric chloide can not be obtained by heating hydrated ferric chloride. (2) $FeSO_4$ can be used as primary standard. (3) $ZnCl_2$ solution on treating with H_2S gives black precipitate. (4) $CuSO_4$ and $FeSO_4$ both gets dissolved in NH_4OH .						
14.	Cu ²⁺ can be reduced to (1) Hyposolution	o Cu⁺ on addition of : (2) KCN (aq)	(3) KSCN	(4) All of these			
15.	When FeSO₄ is strong (1) One	ly heated, the number of (2) Two	acidic gases produced is (3) Three	s : (4) Four			
16.	$Fe(CN)_{3} + KCN \longrightarrow X \xrightarrow{FeCl3 SCl_{n}} Y$ Y is: (1) Brown colored complex, Inner orbital complex (2) White colored complex, Inner orbital complex (3) Blue colored complex, outer orbital complex (4) Blue coloured compex, Inner orbital complex						
17.	On heating $KMnO_4$, on (1) K_2MnO_4	e among the following is (2) O ₂	not formed : (3) MnO ₂	(4) MnO.			
18.	Reaction of KMnO ₄ in neutral or very weakly alkaline solution can be represented as : (1) $MnO_4^- + 2H_2O + 3e^- \rightarrow MnO_2 + 4OH^-$. (2) $2MnO_4^- + 2OH^- \rightarrow 2MnO_4^{2-} + 1/2O_2 + H_2O$. (3) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$. (4) $MnO_4^- + e^- \rightarrow MnO_4^{2-}$.						
19.	$KMnO_4$ in excess on explosively on heating (1) Mn_2O_7 , MnO_2	treatment with concentra forming (Y) . The (X) and (2) Mn ₂ O ₇ , Mn ₂ O ₃	ated H_2SO_4 forms a cor d (Y) are respectively : (3) MnSO ₄ , Mn ₂ O ₃	mpound (X) which decomposes (4) Mn_2O_3 , MnO_2			
20.	Which of the following statement is wrong ? (1) An acidified solution of $K_2Cr_2O_7$ liberates iodine from iodides. (2) In acidic solution dichromate ions are converted to chromate ions. (3) Ammonium dichromate on heating undergo exothermic decomposition to give Cr_2O_3 . (4) Potassium dichromate is used as a titrant for Fe ²⁺ .						
21.	The image on an expo (1) AgBr	sed and developed photo (2) [Ag(C ₂ O ₃) ₂] ³⁺	ographic film is due to : (3) Ag	(4) Ag ₂ O.			
22.	The yellow colour solu of : (1) CrO ₅	tion of Na_2CrO_4 changes (2) CrO ₃	to orange red on passir (3) Na ₂ Cr ₂ O ₇	ng CO_2 gas due to the formation (4) Na ₃ CrO ₈ .			
23.	What happens when a (1) FeO_4^{2-} is converted (2) CrO_4^{2-} is reduced to (3) CrO_4^{2-} is converted (4) FeO_4^{2-} is reduced to	molten mixture of K_2FeC_4 to H_2FeO_4 to Cr^{3+} liberating O_2 to Cr^{3+} to Fe^{3+} liberating O_2	D_4 and $K_2 CrO_4$ is acidified	1?			

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24.	 Why silver chloride is used in photochromic spectacles ? (1) Silver halides darken in light owing to photochemical decomposition (2) Silver halides produced elemental silver in light. (3) If the halogen produced is kept in close proximity to finely divided silver chloride, the silver metal is formed. (4) All of these. 						
25.	In which of the following compound & silver, along (1) Ag + dilute HNO_3 .	ing reactions, reaction on ng with liberation of gas f (2) Ag + Conc. HNO ₃	of silver with the given (3) Ag + conc. H_2SO_4	acids lead to the formation of (4) All of these			
26.	Which of the followin permanganate? (1) O_3	g can be used for the (2) Cl ₂	e conversion of potass (3) CO ₂	ium manganate to potassium (4) All.			
27.	Reaction of potassium (1) CuCrO ₄ only (3) CuCr ₂ O ₇ only	chromate and $CuSO_4$ in a	aqueous solution produce (2) $Cu_5[CrO_4]_2$ only (4) both CuCrO ₄ and Cu	es : J ₂ Cr ₂ O ₇ .			
28.	 Pick out the correct statements from the following : 1. Cobalt (III) is more stable in octahedral complexes. 2. Zinc forms coloured ions or complexes 3. Most of the d-block elements and their compounds are ferromagnetic 4. Osmium shows (VIII) oxidation state 5. Cobalt (II) is more stable in octahedral complexes. (1) 1 and 2 (2) 1 and 3 (3) 2 and 4 (4) 1 and 4 						
29.	Transuranic elements b (1) Np	begin with (2) Cm	(3) Pu	(4) U			
30.	Lanthanide contraction (1) Gd	is observed in : (2) At	(3) Xe	(4) Ac			
31.	The decreasing order o (1) Ni > Co > Fe > Mn > (3) Ni > Co > Mn > Fe >	f density of 3d series ele > Cr > Cr	ments from Cr to Ni is : (2) Mn > Cr > Fe > Co > (4) Co > Ni > Fe > Mn >	⊳ Ni ⊳ Cr			
32.	The stable oxidation sta (1) Cr ²⁺	ate of Cr is : (2) Cr ³⁺	(3) Cr ⁴⁺	(4) Cr ⁶⁺			
33.	Which of the following p (1) V_2O_5 , Cr_2O_3	pairs of oxides is amphote (2) V_2O_3 , Cr_2O_3	eric in nature ? (3) Mn ₂ O ₇ , CrO ₃	(4) CrO, FeO			
34.	Which of the following metal exhibit most stable +3 oxidation state ?(1) Sn(2) Fe(3) Pb(4) Ag						
35.	One of the constituents of the German silver is : (1) Ag (2) Cu (3) Mg (4) Al						
36.	KMnO4 is a strong oxidizing agent in acid medium. To provide acid medium, H_2SO_4 is used instead ofHCI. This because.(1) H_2SO_4 is a stronger acid than HCI(2) H_2SO_4 is a dibasic acid(3) HCI is oxidized by KMnO4 to Cl2(4) Rate is faster in the presence of H_2SO_4						
37.	Transition metal with hi (1) a base	gher oxidation number w (2) an acid	ill acts as : (3) an oxidising agent	(4) none of the above			

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38.	Vanad (1) dry	lium (III) oxide is ⁄ing agent	a strong: (2) oxidizing ag	gent	(3) reducing agent	(4) wetting agent
39.	Least (1) Fe	paramagnetic pro	operty is shown t (2) Mn	су:	(3) Ni	(4) Cu
40.	Arrang (i) V ⁴⁺ (Atomi (1) (ii)	ge the following id (ii) Mn ⁴⁺ (iii) Fe ³⁺ ic number of V = > (iii) > (i) > (iv)	ons in order of th (iv) Ni ²⁺ 23, Mn = 25, Fe (2) (iii) > (iv) > (eir magr = 26, Ni (ii) > (i)	netic moment : = 28) (3) (iii) > (ii) > (iv) > (i)	(4) (i) > (iv) > (iii) > (ii)
41.	Among energy (i) V ((1) (i) a	g the following tr y. At. no. = 23) (ii) and (iii)	ansition element Cr (At. no. = 24) (2) (ii) and (iv)	s, pick c (iii) Mn	out the element/elements (At. no. = 25) (iv) Cu (A (3) (ii) and (v)	with highest second ionization At. no. = 29 (v) Zn (At. no. 30) (4) only (iv)
42.	One m (1) 6	nole of acidified K	$C_2 Cr_2 O_7$ on reaction (2) 1	on with e	excess of KI will liberate r (3) 7	mole(s) of I ₂ : (4) 3
43.	Match	list – I with List – List – I Metal ion	II and select the	e correct	answer using the codes List – II Magnetic moment (BM	given below the lists
	Α.	Cr³+		1.	√ <u>35</u>	
	В.	Fe ²⁺		2.	$\sqrt{30}$	
	C.	Ni ²⁺		3.	$\sqrt{24}$	
	D.	Mn²+		4.	<u>√15</u>	
				5.	$\sqrt{8}$	
	Codes (1) A - (3) A -	s - 1, B − 3, C − 5, - 4, B − 3, C − 5,	D – 4 D – 1		(2) A – 2, B – 3, C – 5, (4) A – 4, B – 5, C – 3,	D – 1 D – 1
44.	The hi (1) 3d²	ghest magnetic r	noment is showr (2) 3d⁵	n by the t	transition metal with the ((3) 3d ⁷	configuration: (4) 3d ⁹
45.	When chang (1) + 4	sulphur dioxide i ed from : to + 6	s passed throug (2) + 6 to + 4	jh an ac	idified $K_2 Cr_2 O_7$ solution, (3) + 4 to 0	the oxidation state of sulphur is (4) + 4 to +2

	SF	P A	nsv	/ers									
1.	(1)	2.	(2)	3.	(1)	4.	(1)	5.	(4)	6.	(3)	7.	(2)
8.	(1)	9.	(3)	10.	(3)	11.	(4)	12.	(4)	13.	(1)	14.	(4)
15.	(2)	16.	(1)	17.	(4)	18.	(1)	19.	(1)	20.	(2)	21.	(3)
22.	(3)	23.	(4)	24.	(4)	25.	(4)	26.	(4)	27.	(4)	28.	(4)
29.	(1)	30.	(1)	31.	(1)	32.	(2)	33.	(1)	34.	(2)	35.	(2)
36.	(3)	37.	(3)	38.	(3)	39.	(4)	40.	(3)	41.	(4)	42.	(4)
43.	(3)	44.	(2)	45.	(1)								
	SE		مايية	ion									

(1) Electron configuration of V is [Ar] 3d³ 4s² and thus maximum 5 electrons participate in bonding. 1. (2) Electron configuration of Cr is [Ar] 3d⁵ 4s¹ and thus maximum 6 electrons participate in bonding. (3) Electron configuration of Co is [Ar] 3d⁷ 4s². In octahedral splitting in presence of ligands, half filled

 t_{2a}^{6} has higher CFSE and thus +3 oxidation state is most stable.

(4) Electron configuration of Sc is [Ar] 3d¹ 4s² and thus maximum 3 electrons participate in bonding.

2. Transition metal oxide with highest oxidation states is most acidic in character because of the very less difference in the values of electronegativity between Mn^{7+} and O^{2-} , and the decreasing order of acidic

character is $Mn_2O_7 > MnO_2 > Mn_2O_3 > > MnO$.

- 3. First ionisation energies of 3d-series (first transition series) increase with increase in atomic number due to (1) increase in nuclear charge (2) decrease in atomic size.
- (i) Valence shell electron configuration of Ti^{4+} is $3d^{10} 4s^0$. As there is no unpaired electrons for d-d 4. transition, the solution of ions will be colourless.

(ii) Valence shell electron configuration of Cu⁺ is 3d¹⁰ 4s⁰. As all electrons are paired, there is no d–d transition, so the solution of ions will be colourless.

(iii) Valence shell electron configuration of Co^{3+} is $3d^6 4s^0$. As there are 4 unpaired electrons, there is d-d transition of electron, so the solution of ions will be coloured.

(iv) Valence shell electron configuration of Fe²⁺ is 3d⁶ 4s⁰. As there are 4 unpaired electrons, there is dd transition of electron, so the solution of ions will be coloured.

- 5. (1) Valence shell electron configuration of Co³⁺ is 3d⁶ 4s⁰. So has 4 unpaired electrons.
 - (2) Valence shell electron configuration of Fe^{3+} is $3d^5 4s^0$. So has 5 unpaired electrons.
 - (3) Valence shell electron configuration of Cr²⁺ is 3d⁴ 4s⁰. So has 4 unpaired electrons.
 - (4) Valence shell electron configuration of V^{3+} is $3d^2 4s^0$. So has 2 unpaired electrons.

It has least number of unpaired electrons, so it has least magnetic moment.

- 6. If a non-metal occupies interstitial sites of a metal, the metal becomes less malleable. This is because the non-metal atom forms covalent bonds with metal atoms and covalent bond is rigid and directional.
- 7. (1) Oxidation state of iron is +3 but it can exceed to a maximum of +6. Oxidation state of cobalt is +3 but it can exceed to a maximum of +4.
 - (2) Highest oxidation state of Cr in CrO₂Cl₂ is + 6 and highest oxidation state of Mn in MnO₄ is + 7.

(3) Oxidation state of titanium is +2 but it can exceed to a maximum of +4. Oxidation state of Mn is +4 but it can exceed to a maximum of +7.

(4) Oxidation state of cobalt is +3 but it can exceed to a maximum of +4. Oxidation state of Mn is +7 which is its highest oxidation state.

8. CuCl absorbs CO, SO₂, C₂H₂ CuCl + 2CO \rightarrow 2CuCl.CO.

9. FeCl₂ exists as Fe₂Cl₂ (a dimer) in vapour state. The solution is acidic due to the formation of HCl and brown due to the formation of Fe(OH)₃. $FeCl_3 + 3H_2O \rightarrow Fe(OH)_3$ (Brown) + 3HCl 10. (1) Cu₂O is red white CuO is black. (2) Obtained on heating malchite ore not heamatite $CuCO_3.Cu(OH)_2 \xrightarrow{\Delta} 2 CuO + CO_2 + H_2O$ (3) 3 CuCl₂.2H₂O $\xrightarrow{\Delta}$ CuO + 2CuCl + 2HCl + Cl₂ + 5H₂O (4) $2CuFeS_2 + 4O_2 \longrightarrow Cu_2S + 2FeO + 3SO_2$ 12. $2CuSO_4 + 2NaCl + SO_2 + 2H_2O \longrightarrow Cu_2Cl_2 + Na_2SO_4 + 2H_2SO_4$ $Cu_2Cl_2 + H_2S \longrightarrow Cu_2S + 2HCI$ (Black ppt.) Cu_2Cl_2 + aq. $NH_3 \longrightarrow [Cu(NH_3)_2]Cl$ Soluble complex $Cu_2Cl_2 + 4 \text{ HCl} \longrightarrow 2 \text{ H}_2CuCl_3$ $2\text{FeCl}_3.6\text{H}_2\text{O} \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3 + 6\text{HCl} + 9\text{H}_2\text{O}_3$ 13. True. (1) False, FeSO₄ is oxidised to Fe³⁺ early, so it is not used as primary standard. But Mohr's salt (2) $[FeSO_4.(NH_4)_2SO_4.6H_2O]$ can be used. (3) False, $ZnCl_2 + H_2S \longrightarrow ZnS + 2HCI$ white precipitate (4) False, $CuSO_4 + 4NH_4OH \longrightarrow [Cu(NH_3)_4]SO_4 + 4H_2O$ Deep blue solution $FeSO_4 + 2NH_4OH \longrightarrow Fe(OH)_2 + (NH_4)_2SO_4$ Insoluble 14. $S_2O_3^{2-}$, CN⁻, SCN⁻ and I⁻ act as reducing agent $Cu^{2+} + S_2O_3^{2-} \longrightarrow Cu^+ + S_4O_6^{2-}$ $Cu^{2+} + CN^{-} \longrightarrow Cu^{+} + (CN)_{2}$ $Cu^{2+} + SCN^{-} \longrightarrow Cu^{+} + (SCN)_{-}$ 15. SO₂ and SO₃ $FeSO_4 \longrightarrow Fe_2O_3 + SO_2\uparrow + SO_3\uparrow + O_2\uparrow$ The acidic gases produced are SO₂ and SO₃ 16. $X : [K_2 Fe(CN)_2)$ Y : Fe [Fe(CN),] $2KMnO_4 \xrightarrow{750K} K_2MnO_4 + MnO_2 + O_2$. 17. 18. $MnO_{4}^{-} + 3e^{-} + 2H_{2}O \longrightarrow MnO_{2} + 4OH^{-}$ (neutral / weak alkaline medium) 19. $2KMnO_4 + 3H_2SO_4 \longrightarrow 2KHSO_4 + (MnO_3)_2SO_4 + 2H_2O_4$ $(MnO_3)_2SO_4 + H_2O \longrightarrow Mn_2O_7 + H_2SO_4$ $Mn_2O_7 \xrightarrow{\Delta} 2MnO_2 + \frac{3}{2}O_2$ (1) $\operatorname{Cr}_{2}O_{7}^{2-}$ + 14H⁺ + 6I⁻ \longrightarrow 2Cr³⁺ + 3I₂ + 7H₂O. 20.

(2) In acidic solution, actually chromate is converted to dichromate.

 $2CrO_{4}^{2-} + 2H^{+} \rightarrow Cr_{2}O_{7}^{2-} + H_{2}O.$ (3) $(NH_{4})_{2}Cr_{2}O_{7} \xrightarrow{\Delta} N_{2} + 4H_{2}O + Cr_{2}O_{3}.$ (4) $6Fe^{2+} + Cr_{2}O_{7}^{2-} + 14H^{+} \longrightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_{2}O.$

- **21.** Quinol developer (a reducing agent) reduces AgBr to Ag. $2AgBr^*(s) + 2OH^-(aq) + C_6H_5(OH)_2(aq) \longrightarrow 2Ag(s) + 2H_2O + C_6H_4O_2(aq) + 2Br^-(aq)$ Where AgBr* represents a molecules of AgBr exposed to light.
- **22.** $\operatorname{CO}_2 + \operatorname{H}_2 \operatorname{O} \longrightarrow \operatorname{H}_2 \operatorname{CO}_3 \Longrightarrow 2\operatorname{H}^+ + \operatorname{CO}_3^{2-}$; $\operatorname{CrO}_4^{2-} + 2\operatorname{H}^+ \Longrightarrow \operatorname{Cr}_2 \operatorname{O}_7^{2-}$ (orange red) + $\operatorname{H}_2 \operatorname{O}$
- **23.** In FeO₄²⁻, Fe is in very high oxidation state (+6) and hence unstable, so it gets reduced to Fe³⁺ liberating O₂. CrO₄²⁻ in acidic medium converted to Cr₂O₇²⁻.
- 24. AgCl \xrightarrow{hv} Ag \downarrow + 1/2 Cl₂ (black)

If souce of light is removed, we get back Agce and blacknem due to Ag removed.

- 25. Ag +dilute $HNO_3 \rightarrow AgNO_3 + NO(g)$ Ag + conc. $HNO_3 \rightarrow AgNO_3 + NO_2(g)$ Ag + conc. $H_2SO_4 \rightarrow Ag_2SO_4 + SO_2(g)$
- $\begin{array}{lll} \textbf{26.} & 2K_2MnO_4 + CI_2 \rightarrow 2KMnO_4 + 2KCI & ; & 2K_2MnO_4 + H_2O + O_3 \rightarrow 2KMnO_4 + 2KOH + O_2 \ . \\ & 3K_2MnO_4 + 2CO_2 \rightarrow 2KMnO_4 + MnO_2 + 2K_2CO_3 \ . \end{array}$
- **27.** Aqueous solution of $CuSO_4$ is acidic in nature, it converts some $CuCrO_4$ to $CuCr_2O_7$.
- In Co⁺³ ion, electronic configuration |Ar|₁₈ 3d⁶4s⁰. For octahedral complex 4 unpaired electron get paired and in configuration become t_{2g}⁶ eg⁰ and hybridization d²sp³.
 Os has maximam VIII oxidation state.
- **29.** After uranium all elements are transuranic element.
- **31.** Increase in atomic mass results in a general increase in the density of these elements from Cr to Ni. i.e. 8.9 > 8.7 > 7.8 > 7.21 > 7.19 g cm⁻³.
- **32.** Cr³⁺ is most stable because in aqueous solution it has higher CFSE on account of half filled t³_{2g} energy level of 3d orbitals in octahedral spliting.
- **33.** V_2O_5 and Cr_2O_3 are amphoteric in nature. Mn₂O₇ and CrO₃ are acidic in nature. V_2O_3 , CrO and FeO are basic in nature.
- **34.** (1) Valence shell electron configuration of $_{50}$ Sn³⁺ is 5s¹ 5p⁰.
 - (2) Valence shell electron configuration of Fe^{3+} is $3d^5 4s^0$.
 - Fe³⁺ will be most stable because it has extra stability due to exactly half filled 3d orbitals.
 - (3) Valence shell electron configuration of ${}_{82}Pb^{3+}$ is $4d^{10} 5s^1$.
 - (4) Valence shell electron configuration of Ag^{3+} is $4d^8 5s^0$.
- 35. German silver is alloy of Cu, Zn and Ni. It has no silver in it but it shines like silver. Alloy Components Bronze Cu (80 – 90%) and Sn (20 – 10%)

Brass	Cu and Zn	
Gun metal	Cu (72 - 80%) and Sn (28 - 20%)	%)
Bell metal	Cu + Sn + Zn	

- **36.** $2MnO_4^- + 10CI^- + 16H^+ \longrightarrow 2Mn^{2+} + 5CI_2 + 8H_2O$
- **37.** The metal with higher oxidation state have the tendency to oxidise the substance and itself gets reduced.
- **38.** V^{+3} (3d²)get oxidise into V^{+5} ($|Ar|_{18}$ 3d⁰) so it behave as strong reducing agent
- **39.** The element having unpaired electron is paramagnetic, More the number of unpaired electrons, more will be paramagnetic character.

Write the valence shell configuration of the given element to find which one of than will have maximum paramagnetic character.

Mn (25) = 1s², 2s², 2p ⁶ , 3s², 3p ⁶ , 4s², 3d⁵,		5 unpaired electrons
Fe (26) = 1s ² , 2s ² , 2p ⁶ , 3s ² , 3p ⁶ , 4s ² , 3d ⁶ ,	<i>.</i>	4 unpaired electrons
Ni (28) = 1s ² , 2s ² , 2p ⁶ , 3s ² , 3p ⁶ , 4s ² , 3d ⁸	<i>:</i> .	2 unpaired electrons
Cu (29) = 1s ² , 2s ² , 2p ⁶ , 3s ² , 3p ⁶ , 4s ¹ , 3d ¹⁰	<i>.</i>	1 unpaired electrosn
Mn has maximum and Cu has least par	ra magno	etic property.

	lon E.C.	Number of unpaired electron	$\mu = \sqrt{n(n+2)} \mathbf{B.M.}$
(i)	$_{23}V^{+4} = Ar _{18} 3d^{1}4s^{0}$	1	$\sqrt{3}$
(ii)	$_{25}$ Mn ⁺⁴ = Ar _{18} 3d ³ 4s ⁰	3	$\sqrt{15}$
(iii)	$_{26}$ Fe ⁺³ = Ar _{18} 3d ⁵ 4s ⁰	5	$\sqrt{35}$
(iv)	$_{28}$ Ni ⁺² = Ar ₁₈ 3d ⁸ 4s ⁰	2	$\sqrt{8}$
So co	prrect order of megnetic n	noment is : (iii) > (ii) > (iv) > (i)	

41. $_{29}$ Cu = $|Ar|_{18}$ 3d¹⁰4s¹

40.

29Cu+ |Ar|18 3d10 4s0

in Cu^{+1} ion, electronic configuration is $3d^{10}$ (Complete d orbital) so removal of electron required higher energy.

42. $Cr_2O_7^{-2} + 14H^+ + 6I^- \rightarrow 2Cr^{+3} 3I_2 + 7H_2O$

43.		lon	E.C.	Number of unpaired electron	$\mu = \sqrt{n(n+2)} \mathbf{B.M}.$
	(1)	24 Cr+3	Ar ₁₈ 3d ³ 45 ⁰	3	<u>√15</u>
	(2)	$_{26}$ Fe ⁺²	Ar ₁₈ 3d ⁶ 45 ⁰	4	$\sqrt{24}$
	(3)	28 ^{Ni+2}	Ar ₁₈ 3d ⁸ 45 ⁰	2	$\sqrt{8}$
	(4)	₂₅ Mn+2	Ar ₁₈ 3d⁵ 45º	5	$\sqrt{35}$

44. $\mu = \sqrt{n (n+2)}$; 3d⁵ has maximum, 5 unpaired electrons so it will have highest magnetic moment.

45.
$$\operatorname{Cr}_{2}O_{7}^{-2} + 3SO_{2} + 2H^{+} \rightarrow 2\operatorname{Cr}^{+3} 3SO_{4}^{-2} + H_{2}O$$
 change in O.N. of SO₂ from 4 to 6.