Basi	c Exercise			
d - B	lock Elements			
1.	For a catalyst which co	ondition is not essential :-		
	(1) Variable valency		(2) High ionisation energy	gy
	(3) Empty orbitals		(4) Free valency on the s	surface
Ans.	(2)			
2.	To which of the followi	ing series the transition eler	ments from $Z = 39$ to $Z = 48$ b	elong?
	(1) 3d series	(2) 4d series	(3) 5d series	(4) 6d series
Ans.	(2)			
3.	$KMnO_4$ on treatment w The (X) and (Y) are res	vith conc. H ₂ SO ₄ forms a compectively	npound (X) which decompose	es explosively on heating forming (Y).
	$(1) \operatorname{Mn}_{2}O_{7}, \operatorname{MnO}_{2}$	$(2) \operatorname{Mn}_2 O, \operatorname{Mn}_2 O_3$	$(3) \operatorname{MnSO}_4, \operatorname{Mn}_2\operatorname{O}_3$	$(4) \operatorname{Mn}_2 \operatorname{O}_3, \operatorname{MnO}_2$
Ans.	(1)			
4.	Which pair of ions is col	ourless-		
	$(1) \operatorname{Mn}^{+3}, \operatorname{Co}^{+3}$	(2) $\mathrm{Fe}^{_{3+}}, \mathrm{Cr}^{_{+3}}$	(3) Zn^{2+}, Sc^{3+}	(4) Ti^{2+}, Cu^{2+}
Ans.	(3)			
5.	$(NH_4)_2 Cr_2 O_7 (Ammoni$	um dichromate) is used in f	ire works. The green coloured	powder blown in air is :
	(1)Cr ₂ O ₃	(2) CrO ₂	$(3) \operatorname{Cr}_2 \operatorname{O}_4$	(4) CrO ₃
Ans.	(1)			
6.	$\operatorname{Cr}_2\operatorname{O}_7^{2-} \xrightarrow{X} 2\operatorname{Cr}\operatorname{O}_4^{2-}$	X and Y are respectively		
	$(1) X = OH^{-}, Y = H^{+}$	(2) $X = H^+, Y = OH^-$	(3) $X = OH^-, Y = H_2O_2$	$(4) X = H_2O_2, Y = OH^-$
Ans.	(1)			
7.	During estimation of or	kalic acid Vs KMnO ₄ , self ir	ndicator is :	
	(1)KMnO ₄	(2) Oxalic acid	(3) K ₂ SO ₄	(4) MnSO ₄
Ans.	(1)			
8.	Colourless solution of is dipped in each one o	the following four salts are of these. Which solution will	placed separately in four dif Il turn blue?	ferent test tubes and a strip of copper
	$(1) \text{KNO}_3$	(2) AgNO ₃	$(3) Zn(NO_3)_2$	(4) $ZnSO_4$
Ans.	(2)			
9.	$Cu + conc. HNO_3(hot)$	\longrightarrow Cu(NO ₃) ₂ + X (oxide o	of nitrogen); then X is :	
	$(1)N_{2}O$	$(2)NO_2$	(3)NO	$(4) N_2 O_3$
Ans.	(2)			
10.	The higher oxidation s	tates of transition elements	are found to be the combinat	ion with A and B, which are :
	(1)F,O	(2) O, N	(3)O,Cl	(4) F, Cl
Ans.	(1)			
11.	Magnetic moment of	x^{n+} is $\sqrt{24}$ B.M. Hence	e No. of unpaired electro	on and value of 'n' respectively.
	(Atomic number = 26)			
	(1)4,3	(2)3,5	(3)4,2	(4)4,1
Ans.	(3)			
12.	The product of oxidation	of I^- with MnO_4^- in alkaline	e medium is :	
	(1) IO_3^{-}	(2) I_2	(3)IO ⁻	(4) IO_4^{-}
Ans.	(1)			

13.	Cop	per becomes green wh	en exposed to moist air for le	onger period.				
	(1) Because of the formation of a layer of cupric oxide on the surface of copper.							
	(2)	Because of the form	ation of a layer of basic carl	ponate of copper on the sur-	face of copper.			
	(3) Because of the formation of a layer of cupric hydroxide on the surface of copper.							
	(4)	(4) (1) and (3) both						
Ans.	(2))						
14.	Whi	ch of the following oxi	de of chromium is amphoter	ic in nature				
	(1)C	rO	$(2) \operatorname{Cr}_2 \operatorname{O}_3$	(3) CrO ₃	$(4) \operatorname{CrO}_5$			
Ans.	(2))						
15.	Com	pared to Cu ²⁺ having	3d ⁹ configuration, Cu ⁺ havin	g 3d ¹⁰ configuration :-				
	(1)Is	s more stable		(2) Is equally stable				
	(3) I	s less stable		(4) Stability depends upor	n nature of copper salt			
Ans.	(3))						
16.	Pic	ck out the wrong stater	nent :-					
	(1)	$K_2 Cr_2 O_7$ reduces ferr	ic sulphate to ferrous sulpha	te				
	(2)	Iron do not form amal	gam					
	(3)	Permanent magnet is	made by an alloy called Alni	co				
	(4)	In the Lathanides ion	ic radius decreases from Lat	-3 to Lu ⁺³				
Ans.	(4))						
17.	CrO	₃ is red or orange in co	lour. The nature of oxide is :	-				
	(1)A	cidic	(2) Basic	(3) Amphoteric	(4) Neutral			
Ans.	(1))						
18.	Cl ₂ g	gas is obtained by vari	ous reactions but not by :					
	(1)	$KMnO_4 + conc. HCl$	\rightarrow					
	(2)	$\mathrm{KCl} + \mathrm{K}_{2}\mathrm{Cr}_{2}\mathrm{O}_{7} + \mathrm{co}$	nc. $H_2SO_4 \xrightarrow{\Delta}$					
	(3)	$MnO_2 + conc. HCl$	$\xrightarrow{\Delta}$					
	(4)	$KCl + F_2 \xrightarrow{\Delta}$						
Ans.	(2))						
19.	Max	imum magnetic mome	ent is shown by :					
	(1) d	5	$(2) d^6$	$(3) d^7$	$(4) d^8$			
Ans.	(1))						
20.	Disp	proportion can be show	vn by					
	(1) N	$/{\rm InO_4^{2-}}$ in acidic mediu	m	(2) Cu^+ in aqueous medium				
	(3) C	Cl ₂ in alkaline medium		(4) All of these				
Ans.	(4))						
21.	The	basic character of the	ransition metal monoxides	follows the order :				
	(Ato	mic No. Ti = 22, $V = 23$	c, Cr = 24, Fe = 26)					
	(1)T	iO>FeO>VO>CrO		(2) TiO > VO > CrO > FeO				
	(3) V	vO>CrO>TiO>FeO		(4) CrO>VO>FeO>TiO				
Ans.	(2))						

22. AgCl on fusion with sodium carbonate, gives : (1)Ag₂CO₃ $(2) Ag_{2}O$ (3)Ag (4)Ag₂C₂ Ans. (3) 23. Which of the following reactions is used to estimate copper volumetrically? (1) $2Cu^{2+} + 4F^{-} \longrightarrow Cu_2F_2 + F_2$ (2) $\operatorname{Cu}^{2+} + 4\operatorname{NH}_3 \longrightarrow [\operatorname{Cu}(\operatorname{NH}_3)_4]^{2+}$ (3) $2Cu^{+2} + 2CNS^{-} + SO_2 + 2H_2O \longrightarrow Cu_2(CNS)_2 + H_2SO_4 + 2H^+$ (4) $2Cu^{2+} + 4I^{-} \longrightarrow Cu_2I_2 + I_2$ Ans. (4) 24. Atomic size of gold is almost the same as that of silver. It is due to : (1) the same crystal structure of silver and gold (2) almost the same electropositive character of the two metals (3) transition metals contraction in a series (4) the effect of lanthanide contraction Ans. (4) **f-Block Elements** 25. The elements from thorium (At.No. 90) to lawrencium (At.No. 103) in which 5f energy levels are filled up are called: (1) lanthanides (2) rare earths (3) actinides (4) transuranics (3) Ans. Select the element in the following which does not show +4 oxidation state : 26. (1) Ti (2) Zr (3) La (4) Pt Ans. (3) With increase in atomic number the ionic radii of actinides : 27. (1) contract slightly (2) increase gradually (3) show no change (4) change irregularly (1) Ans. 28. The general electronic configuration of lanthanide is : (2) [Xe] 4f⁰⁻¹⁴ 5d¹⁻² 6s¹ (1) [Xe] 4f¹⁴ 5d⁰⁻¹ 6s² (3) [Xe] $4f^{0-14} 5d^{0-1} 6s^{1-2}$ (4) None of these (4) Ans. 29. Cerium can show the oxidation state of +4 because (1) it resemble alkali metals (2) it has very low value of I.E. (3) of its tendency to attain noble gas configuration of xenon (4) of its tendency to attain $4f^7$ configuration Ans. (3) In aqueous solution Eu⁺² acts as : 30. (1) an oxidising agent (2) reducing agent (4) None of them (3) can act as redox agent

Ans. (2)

31. The maximum oxidation state shown by actinides is :

(1)+6 (2)+7 (3)+5 (4)+4

Ans. (2)

32.	The outer electronic configuration of gadolinium (At. No. 64) is :						
	(1) $4f^{7}5d^{1}6s^{2}$	(2) $4f^85d^06s^2$	(3) $4f^85d^16s^1$	(4) $4f^{7}5d^{0}6s^{2}$			
Ans.	(1)						
33.	The most characteris	stic oxidation state of lanth	nanides is :				
	(1)+2	(2)+3	(3)+4	(4) none of these			
Ans.	(2)						
34.	The stable oxidation	state of actinides is :					
	(1)+4	(2)+3	(3)+5	(4)+6			
Ans.	(2)						
35.	Which of the following f - block elements, will change its group on emmitting α -particle (alfa particle) :						
	(a) ₅₈ Ce	(b) ₇₀ Lu	(c) ₉₀ Th	(d) ₉₂ U			
	Correct answer is :-						
	(1) Only a and c	(2) Only b and d	(3)All	(4) None			
Ans.	(1)						
36.	Which of the following pair have almost similar size						
	(1) Ti_{22} and Zr_{40}	(2) Nb_{41} and Ta_{73}	(3) Y_{39} and La_{57}	(4) Ca_{20} and Ir_{31}			
Ans.	(2)						
37.	An increase in both atomic and ionic radii with atomic number occurs in any group of the periodic table. In accordance of this the ionic radii of Ti (IV) and Zr (IV) ions are 0.68 Å and 0.74 Å respectively but for Hf (IV) ion the ionic radius is 0.75 Å, which is almost the same as that for Zr (IV) ion. This is due to :-						
	(1) greater degree of	covalency in compounds of	Hf^{4+}				
	(2) Lanthanide contra	action					
	(3) Difference in the	co-ordination number of Zr ⁺	⁴ and Hf ⁺⁴ in their compour	nds			

(4) Actinide contraction

Ans. (2)

Analytical Exercise

1.	The correct order of ionic radii of Y ³⁺ , La ³⁺ , Eu ³⁺ and Lu ³⁺ is						
	(1) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^3$	+	(2) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$				
	(3) $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$	÷	(4) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$				
Ans.	(4)						
2.	Among the following series	of transition metal ions, the on	he where all metal ions have 30	d ² electronic configuration is :			
	(1) Ti ²⁺ , V ³⁺ , Cr ⁴⁺ , Mn ⁵⁺	(2) Ti ²⁺ , V ²⁺ , Cr ³⁺ , Mn ⁴⁺	(3) Ti ⁺ , V ⁴⁺ , Cr ⁶⁺ , Mn ⁷⁺	(4) Ti^{4+} , V^{3+} , Cr^{2+} , Mn^{5+}			
Ans.	(1)						
3.	The aqueous solution containing which one of the following ions will be colourless :-						
	[Atomic no. : $Sc = 21$, $Fe =$	26, Ti = 22, Mn = 25]					
	(1) Fe^{2+}	(2) Mn^{2+}	(3) Ti^{3+}	(4) Sc^{3+}			
Ans.	(4)						
4.	The oxidation state of chror solution is	nium in the final product form	ned by the reaction between K	I and acidified potassium dichromate			
	(1) + 4	(2) +6	(3) + 2	(4) +3			
Ans.	(4)						
5.	The lanthanide contraction	is responsible for the fact that					
	(1) Zr and Y have about the	same radius	(2) Zr and Nb have similar oxidation state				
	(3) Zr and Hf have about the same radius (4) Zr and Zn have the same oxidation state						
Ans.	(3)						
6.	Which one of the following	nitrates will leave behind a me	tal on strong heating ?				
	(1) Copper nitrate	(2) Manganese nitrate	(3) Silver nitrate	(4) Ferric nitrate			
Ans.	(3)						
7.	Excess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the statements is incorrect for this reaction :-						
	(1) $Na_2S_2O_3$ is oxidised	(2) CuI_2 is formed	(3) Cu_2I_2 is formed	(4) Evolved I_2 is reduced			
Ans.	(2)						
8.	In which of the following or	xidation state of Mn is six					
	(1) $K_2 MnO_4$	(2) MnO_2	(3) KMnO_4	(4) MnO_4^{-1}			
Ans.	(1)						
9.	Which has maximum mag	gnetic moment :-					
	$(1) \operatorname{Co}^{+2}$	$(2) Mn^{+3}$	$(3) \mathrm{Mn}^{+2}$	$(4) \operatorname{Cr}^{+3}$			
Ans.	(3)						
10.	Atomic number 21, show	vs the oxidation states					
	(1)+1	(2)+3	(3)-1	(4)+5			
Ans.	(2)						
11.	Transition element make	s complex compound due to) -				
	(1) Presence of empty d-c	orbital	(2) large size				
	(3) variable valency		(4) presence of 2e ⁻				
Ans.	(1)						
12.	Lanthanoid contraction i	s caused due to					
	(1) the same effective nu	clear charge from Ce to Lu					
	(2) the imperfect shield	ng on outer electrons by 4f	electrons from the nuclear	charge			
	(3) the appreciable shiel	ding on outer electrons by 4	4f electrons from the nuclea	ır charge			
	(4) the appreciable shiel	ding on outer electrons by :	5d electrons from the nucle	ar charge			
		•					

Ans. (2)

- 13. $KMnO_4$ is a strong oxidizing agent in acid medium. To provide acid medium H_2SO_4 is used instead of HCl. This is because
 - (1) H_2SO_4 is a stronger acid than HCl
 - (2) HCl is oxidized by $KMnO_4$ to Cl_2
 - (3) H_2SO_4 is a dibasic acid
 - (4) rate is faster in the presence of H_2SO_4

Ans. (2)

- 14. When hydrogen peroxide is added to acidified potassium dichromate, a blue colour is produced due to formation of
 - (1) CrO_3 (2) Cr_2O_3 (3) CrO_5 (4) $CrO_{4^{-1}}$

Ans. (3)

- 15. Identify the incorrect statement among the following
 - (1) 4f and 5f orbitals are equally shielded
 - (2) d-Block elements show irregular and erratic chemical properties among themselves
 - (3) La and Lu have partially filled d orbitals and no other partially filled orbitals
 - (4) The chemistry of various lanthanoids is very similar

Ans. (3)

- 16. The actinoids exhibit more number of oxidation states in general than the lanthanoids. This is because
 - (1) the 5f orbitals extend further from the nucleus than the 4f orbitals
 - (2) the 5f orbitals are more buried than the 4f orbitals
 - (3) there is a similarity between 4f and 5f orbitals in their angular part of the wave function
 - (4) the actinoids are more reactive than the lanthanoids

Ans. (2)

In $\operatorname{Cr}_2O_7^{-2} \longrightarrow \operatorname{Cr}O_4^{-2}$ reaction the change in oxidation number is :-17. (1)+3(2) - 3(3)2(4)0Ans. (4) Which of the following properties of Zr and Hf can be explained due to lanthanide contraction : 18. (1) Radius of Zr and Hf is same (2) Their EN is same (3) They are f-block elements (4)All Ans. (1) 19. Similar sizes of second and third transition elements can be explained on the basis of : (1) Inert-pair effect (2) Screening effect (4) Increasing effective nuclear charge (3) Lanthanide contraction

Ans. (3)

- 20. Iron exhibits +2 and +3 oxidation states. Which of the following statements about iron is incorrect?
 - (1) Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds
 - (2) Ferrous oxide is more basic in nature than the ferric oxide
 - (3) Ferrous compounds are relatively more ionic than the corresponding ferric compounds
 - (4) Ferrous compounds are less volatile than the corresponding ferric compounds
- Ans. (1)
- 21. Four successive members of the first row transition elements are listed below with atomic numbers. Which one of them is expected to have the highest $E^0_{M^3+M^{2+}}$ value ?

(1)
$$Cr(Z=24)$$
 (2) $Mn(Z=25)$ (3) $Fe(Z=26)$ (4) $Co(Z=27)$

Previous Year Exercise

1.	The reason for greater range of oxidation states in actinoids is attributed to(1) The radioactive nature of actinoids(2) Actinoid contraction			[NEET-2017]	
	(3) 5f 6d and 7s levels	having comparable energi	es		
	(4) 4f and 5d levels bei	ng close in energies			
Ans.	(1) If and built for levels being (3)				
2.	Name the gas that can re	eadily decolourises acidifie	ed KMnO ₄ solution [•]	INEET-2017	
	(1) CO	(2) SO	(3)NO	(4) P O	
Ans.	(1) C C ₂	(-) = 0 = 0	$(0)^{1}(0)_{2}$	(), 2, 5	
3.	Which one of the follow	ing statements related to l	anthanons is incorrect?	[NEET-(Phase-2)-2016]	
	(1) Europium shows $+2$	oxidation state		[]	
	(1) Europrani shows <u>-</u>(2) The basicity decrease	ses as the ionic radius dec	reases from Pr to Lu		
	(3) All the lanthanons a	re much more reactive that	n aluminium		
	(4) $Ce(+4)$ solutions are	widely used as oxidizing	agent in volumetric analysi	s	
Ans	(3)	where used us oxidizing	agent in vorumetrie anarysi	5	
Анз. Д	(3) Jahn-Teller effect is not	observed in high spin com	nleves of	[NFFT_(Phase_2)_2016]	
ч.	(1) d^7	(2) d^8	(3) d^4	(4) d^9	
Ans.	(2)	()		()	
5.	Which one of the follow	ing statements is corrected	d when SO ₂ is passed throu	igh acidified K ₂ Cr ₂ O ₇ solution ?	
		C	2 1	[NEET- 2016]	
	(1) Green $Cr_2(SO_4)$, is for	rmed	(2) The solution turns bl	ue	
	(3) The solution is decol	ourized	(4) SO_2 is reduced		
Ans.	(1)				
6.	The electronic configura	tions of Eu (Atomic No. 63	B), Gd (Atomic No. 64) and	Tb (Atomic No. 65) are	
	(1) $[\mathbf{V}_{a}]AE[a] [\mathbf{V}_{a}]AE[5]$	116 a2 and [Va]4496a?	(1) $[\mathbf{V}_{0}] A f (c_{0}^{2}) [\mathbf{V}_{0}] A f (c_{0}^{2})$	[NEET- 2016]	
	(1) $[Xe]41'0S^2$, $[Xe]41'30'$	755° and $[Xe]41^{\circ}05^{\circ}$	(2) $[Xe]41'05^{2}$, $[Xe]41'05^{2}$ and $[Xe]41'50'05^{2}$		
A	$(3) [Xe]41^{\circ}50^{\circ}08^{\circ}, [Xe]41^{\circ}$	1/51* and [Xe]41/08 ²	(4) [Xe]41°50°65°, [Xe]41	- 30-65- and [Xe]41-30-65-	
Ans. 7	(I) Cadalinium halanga ta 4	faorica Ita atomia numba	r number is 64 Which of th	a fallowing is the correct electronic	
/.	configuration of gadolini	ium ?	i number is 64. which of th	IRe-AIPMT-2015	
	(1) [Xe] $4f^{7}5d^{1}6s^{2}$	(2) [Xe]4f ⁶ 5d ² 6s ²	$(3) [Xe] 4f^8 6d^2$	(4) $[Xe]4f^{9}5s^{1}$	
Ans.	(1)				
8.	Because of lanthanoid con	ntraction, which of the follo	wing pairs of elements have	nearly same atomic radii ? (Numbers	
	in the parenthesis are ato	omic numbers)		[AIPMT-2015]	
	(1) Zr (40) and Ta (73)	(2) T ₁ (22) and Zr (40)	(3) Zr (40) and Nb (41)	(4) Zr (40) and Hf (72)	
Ans.	(4)				
9.	Blue colour of gas products	(2) Fr	(2) Mag	[AIIMS- 2015]	
	(1) $\operatorname{Cr}_2 \operatorname{O}_3$	$(2) \operatorname{Fe}_2 \operatorname{O}_3$	(3) MnO	(4) CoO	
Ans.	(4) Cain is see to a			LA TIR #0. 404 #1	
10.	Coin is made up (1) Critical Al	(2) and $C_{\rm M}$	(2) only \mathbf{F}_{2}	[AIIWIS- 2015]	
A	(1) Cu + Al	(2) only Cu	(3) only re	(4) None	
Ans.	(1)				

11.	Highly unstable spec	ies is			[AIIMS- 2015]		
	(1) Sc(II)	(2) Ti(II)	(3) Co(II)	(4) V(II)			
Ans.	(1)						
12.	Which of the following	ng is diamagnetic			[AIIMS- 2015]		
	(1) Aurum	(2) Tungsten	(3) Palladium	(4) Niobium			
Ans.	(3)						
13.	The pair of compoun (1) FeCl ₃ , SnCl ₂	ds that can exist together i (2) HgCl ₂ , SnCl ₂	s (3) FeCl ₂ , SnCl ₂	(4) FeCl ₃ , KI	[AIPMT-2014]		
Ans.	(3)						
14.	The reaction of aque $(1) \text{ Mn}^{4+}$ and O_2	ous KMnO ₄ with H_2O_2 in a (2) Mn^{2+} and O_2	acidic conditions gives (3) Mn^{2+} and O_3	(4) Mn^{4+} and 1	[AIPMT-2014] MnO ₂		
Ans.	(2)						
15.	Which magnetic mor Ni=28)	nent 2.83 BM is given by w	which of the following ion:	s ? (At. nos. Ti = 22,	Cr = 24, Mn = 25, [AIPMT-2014]		
	$(1) Ti^{3+}$	$(2) Ni^{2+}$	$(3) Cr^{3+}$	$(4) \mathrm{Mn}^{2+}$			
Ans.	(2)						
16.	Reason of lanthanoid	contraction is		1	[AIPMT-2014]		
	(1) Negligible screer	(1) Negligible screening effect of 'f' orbitals (2) Increasing nuclear charge					
A	(3) Decreasing nucle						
Ans.		1 .1 .1 1.					
17.	Which of the following	b = 70) [NEET-2013]					
	$(1) \mathrm{Sm}^{2+}$	(2) Eu ²⁺	(3) Yb ²⁺	$(4) \mathrm{C} \mathrm{e}^{2+}$	[]		
Ans.	(3)						
18.	Which of the following statements about the interstitial compounds is incorrect ? [NEET-2013]						
	(1) They are chemically reactive						
	(2) They are much harder than the pure metal						
	(3) They have higher melting points than the pure metal						
	(4) They retain metal	lic conductivity					
Ans.	(1)						
19.	Which of the following	ng element has lowest melt	ing point :		[AIIMS- 2013]		
	(1)Cr	(2) Fe	(3) Ni	(4) Cu			
Ans.	(4)						
20.	Maximum no. of unp	aired electrons are present i	n :-		[AIIMS- 2013]		
	(1) Gd^{+3}	(2) Yb^{+2}	(3) Tb^{+2}	$(4) Pm^{+3}$			
Ans.	(1)						
21.	$K_2 Cr_2 O_7$ in acidic me	dium converts into :			[AIIMS-2013]		
	$(1) \operatorname{Cr}^{2+}$	(2) Cr^{3+}	$(3) \operatorname{Cr}^{4+}$	$(4) \operatorname{Cr}^{+5}$			
Ans.	(2)						
22.	Magnetic moment of	Cr ²⁺ is nearest to :-			[AIIMS- 2013]		
	(1) Fe^{2+}	(2) Mn^{2+}	$(3) \operatorname{Co}^{+2}$	(4) Ni^{2+}			
Ans.	(1)						

23.	Which of the statemen	ts is not true?		[AIPMT (Prelims) –2012]			
	(1) $K_2Cr_2O_7$ solution in	acidic medium is orange					
	(2) $K_2Cr_2O_7$ solution b	ecomes yellow on increasin	ig the pH beyond 7				
	(3) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed						
	(4) $Na_2Cr_2O_7$ is preferr	ed over K ₂ Cr ₂ O ₇ in volumet	ric analysis				
Ans.	(4)						
24.	Which one of the follo	wing does not correctly rep	present the correct order of	the property indicated against it?			
				[AIPMT(Prelims)-2012]			
	(1) $Ti < V < Cr < Mn$:	Increasing number of oxida	ation states				
	(2) $Ti^{3+} < V^{3+} < Cr^{3+} <$	Mn ³⁺ : Increasing magnetic	moment				
	(3) $Ti < V < Cr < Mn$:	Increasing melting points					
	(4) $Ti < V < Mn < Cr$:	Increasing 2nd ionization e	enthalpy				
Ans.	(3)						
25.	Which of the following	exhibits only +3 oxidation	state ?	[AIPMT Mains-2012]			
	(1)U	(2) Th	(3)Ac	(4) Pa			
Ans.	(3)						
26.	Four successive member	rs of the first series of the trai	nsition metals are listed below	w. For which one of them the standard			
	$potential (E^{\circ}) $	[AIDMT Maine 2012]					
	potential $\left(\frac{L}{M^{2+}/M} \right)$ val	lues has a positive sign ?		[AIP WIT WAINS-2012]			
	$(1) \operatorname{Co} (Z = 27)$	$(2) \operatorname{Ni} (Z = 28)$	$(3) \operatorname{Cu} (Z = 29)$	(4) Fe ($Z = 26$)			
Ans.	(3)						
27.	Acidified K ₂ Cr ₂ O ₇ solu	ition turns green when Na ₂ s	SO_3 is added to it. This is d	lue to the formation of :			
	$(1) C_{-} C_{0}$	$(2) \subset (50)$	$(2) \cap (2)^{-1}$	[AIPMT (Prelims) -2011]			
	(1) CrSO ₄	$(2) \operatorname{Cr}_2(\mathrm{SO}_4)_3$	$(3) CrO_4^{2-1}$	$(4) \operatorname{Cr}_2(\mathrm{SO}_3)_3$			
Ans.	(2) East that four successive	tuonoition alamanta (Cn M	n Ea and Ca) the stability	of 12 avoidation atota will be there in			
28.	which of the following	order ? (At nos $Cr = 24$ N	n, Fe and Co), the stability $(n = 25 \text{ Fe} = 26 \text{ Co} = 27)$	or +2 oxidation state will be there in [AIPMT (Prelims) –2011]			
	(1) $Cr > Mn > Co > Fe$	(2) $Mn > Fe > Cr > Co$	(3) Fe > Mn > Co > Cr	(4) $Co > Mn > Fe > Cr$			
Ans	(1) CT + WHI + CO + TC						
29.	Which of the following	y ions will exhibit colour in	aqueous solutions?	[AIPMT (Prelims) -2010]			
_>.	(1) $La^{3+}(z=57)$	(2) $Ti^{3+}(z=22)$	(3) $Lu^{3+}(z=71)$	(4) $\operatorname{Sc}^{3+}(z=21)$			
Ans.	(1) <u>L</u> w (<u>L</u> U)	(-) (2)		(1)20 (2 21)			
30.	Which one of the follo	wing ions has electronic co	nfiguration [Ar]3d ⁶ ?	[AIPMT (Prelims) –2010]			
••••	(2) Ni^{3+}	(3) Mn^{3+}	(4) Fe^{3^+}	(1) Co^{3+}			
Ans.	(4)						
31.	Which of the following	p pairs has the same size ?		[AIPMT (Prelims) –2010]			
• • •	(1) Fe^{2+} . Ni ²⁺	(2) Zr^{4+} . Ti ⁴⁺	$(3) Zr^{4+} Hf^{4+}$	(4) Zn^{2+} , Hf^{4+}			
Ans.	(3)	(-) 21 , 11	(0) 22 , 23	(),,,,,,			
32.	Which of the following	oxidation states is the mos	t common among the lanth	anoids ? [AIPMT (Prelims) –2010]			
• = •	(1)4	(2) 2	(3) 5	(4) 3			
Ans	(4)	(-)-		(
33.	The correct order of de	creasing second ionisation e	enthalpy of Ti (22) V(23) (Cr(24) and Mn (25) is -			
		er easing second romsation e		[AJPMT (Prelims) -2008]			
	(1)Ti>V>Cr>Mn	(2)Cr>Mn>V>Ti	(3) V>Mn>Cr>Ti	(4) Mn>Cr>Ti>V			
Ans.	(2)	()		()			
	× /						

34.	Number of moles of MnO_4^- required to oxidize one mole of ferrous oxalate completely in acidic medium will be					
	[AIPMT (Prelims) –2008]					
	(1) 0.2 moles	(2) 0.6 moles	(3) 0.4 moles	(4) 7.5 moles		
Ans.	(2)					
35.	Identify the incorrect st	atement among the follow	wing	[AIPMT (Prelims) –2007]		
	(1) Shielding power of	4f electrons is quite wea	k.			
	(2) There is a decrease	e in the radii of the atom	s or ions as one proceeds	s from La to Lu.		
	(3) Lanthanoid contrac	tion is the accumulation	of successive shrinkages.			
	(4) As a result of lant	nanoid contraction, the p	roperties of 4d series of t	he transition elements		
	have no similarities	s with the 5d series of ele	ements.			
Ans.	(4)					
36	Which one of the follo	wing ions is the most st	able in aqueous solution	[AIPMT (Prelims) -2007]		
20.	(Atomic number $Ti = 2^{2}$	V = 23 Cr = 24 Mn =	25)			
	(1) Mn^{2+}	$(2) Cr^{3+}$	$(3) V^{3+}$	(1) T; ³⁺		
		(2) CI	(3) V	(4) 11		
Ans.	(2)					
37.	More number of oxidation	on states are exhibited by t	he actinoids than by the la	nthanoids. The main reason for this is		
				[AIPMT (Prelims) –2006]		
	(1) More energy differe	nce between 5f and 6d ort	oitals than that between 4f	and 5d orbitals		
	(2) Lesser energy differ	ence between 51 and 6d of	bitals than that between 4	t and 5d orbitals		
	(3) Greater metallic cha	aracter of the lanthanoids t	han that of the correspond	ing actinoids		
	(4) More active nature	of the actinoids				
Ans.	(2)					
38.	Copper sulphate dissolv	es in excess of KCN to giv	(2) [C.:.(CNI) 12	[AIPMT (Prelims) –2006]		
	(I)CUCN	$(2) [Cu(CN)_4]^3$	$(3) [Cu(CN)_4]^2$	$(4) \operatorname{Cu}(\operatorname{CN})_2$		
Ans.	(2)					
39.	In which of the followin (At no $:$ So = 21 Ti = 22	g pairs are both the ions c $N_i = 28$ Cu = 20 Co = 27	oloured in aqueous solution	n ? [AIPMT (Prelims) – 2006]		
	(At. 1105t - 21, 11 - 22)	(2) So ³⁺ Ti ³⁺	(3) $S_{0}^{3+} C_{0}^{2+}$	(4) Ni ²⁺ Cu ⁺		
Anc	(1) NF , IF	$(2) 50^{\circ}, 11^{\circ}$	$(3)30^{\circ},00^{\circ}$	(4) MF ,Cu		
Alls. 40	(I) The number of moles of	KMnO, reduced one mol	e of KI in alkaline mediun	n is [AIPMT(Prelims)-2005]		
40.	(1) One fifth	(2) Five	(3) One	(4) two		
Ans.	(1) One mui	(2)1100	(5) 0110	(+) (**)		
41.	The aqueous solution co	ntaining which one of the	following ions will be col	ourless ? [AIPMT(Prelims)-2005]		
	(Atomic no. $Sc = 21$, Fe	= 26, Ti $= 22$, Mn $= 25$)				
	(1) Sc^{3+}	(2) ${\rm Fe}^{2+}$	(3) Ti^{3+}	(4) Mn^{2+}		
Ans.	(1)					
42.	Four successive member	s of the first row transition	elements are listed below w	vith their atomic numbers. Which one of		
	them expected to have the	he highest third ionization	enthalpy?	[AIPMT(Prelims)-2005]		
	(1) Vanadium ($Z=23$)	(2) Chromium ($Z = 24$)	(3) Iron ($Z = 26$)	(4) Manganese ($Z = 25$)		
Ans.	(4)					
43.	The main reason for larg	er number of oxidation sta	ites exhibited by the actinic	les than the corresponding lanthanides,		
	18 (1) Lassar anarou differ	ance between Stand Ed a	bitals than that between 14	[AIPMI (Prelims)-2005]		
	(1) Lesser energy unler (2) Larger atomic size s	once between of and ou of	nides			
	(2) Laiger atomic size ((3) More energy differe	n actimues than the failtha	utals than that hatwaan 4f.	and 5d orbitals		
	(J) Greater reactive pet	ure of the antioidos than the	ntais man mat between 413			
	(+) Ureater reactive fiat	are or the anticides thall th	ic ianunannucs			

Ans. (1)

Question asked prior to Medical Ent. Exams. 2005

44.	The catalytic activity	The catalytic activity of transition metals and their compounds is ascribed mainly to						
	(1) Their magnetic behaviour							
	 (2) Their unfilled d-orbitals (3) Their ability to adopt variable avidation states 							
	(4) Their chemical re	(4) Their chemical reactivity						
Ans.	(3)							
45.	Which one of the follo	owing elements shows max	imum number of differen	t oxidation states in its compounds?				
	(1)Gd	(2) La	(3) Eu	(4)Am				
Ans.	(4)							
46.	Without losing its cor	ncentration ZnCl ₂ solution	cannot be kept in contact	twith				
	(1) Pb	(2)Al	(3)Au	(4) Ag				
Ans.	(2)							
47.	Which ion is colourle	ess?						
	(1)Cr ⁴⁺	(2) Sc^{3+}	(3) Ti ³⁺	$(4) V^{3+}$				
Ans.	(2)							
48.	General electronic configuration of lanthanides is							
	$(1) (n-2) f^{1-14} (n-1) d^{0}$	$^{0-1}$ ns ²	(2) $(n-2)f^{10-14}(n-1)$	$d^{0-1} ns^2$				
	$(3) (n-2) f^{0-14} (n-1) d^{1}$	$(3) (n-2)f^{0-14} (n-1) d^{10} ns^2 \qquad (4) (n-2)d^{0-1} (n-1) f^{1-14} ns^2$						
Ans.	(1)							
49.	Which of the following shows maximum number of oxidation states?							
	(1)Cr	(2) Fe	(3) Mn	(4) V				
Ans.	(3)							
50.	In the silver plating of copper, $K[Ag(CN)_2]$ is used instead of $AgNO_3$. The reason is							
	(1) A thin layer of Ag is formed on Cu							
	(2) More voltage is	(2) More voltage is required						
	(3) Ag ⁺ ions are completely removed from solution							
	(4) Less availability of Ag^+ ions, as Cu can not displace Ag from $[Ag(CN)_2]^-$ ion							
Ans.	(4)							
51.	$CuSO_4$ when reacts with KCN forms CuCN, which is insoluble in water. It is soluble in excess of KCN, due to formation of the following complex							
	$(1) \operatorname{K}_2[\operatorname{Cu}(\operatorname{CN})_4]$	(2) $K_3[Cu(CN)_4]$	$(3) \operatorname{Cu}(\operatorname{CN})_2$	(4) Cu[K Cu(CN) ₄]				
Ans.	(2)							
52.	Which of the following	ng is expected to be coloure	ed in solutions ?					
	$(1) Cu^+$	$(2) Cu^{2+}$	(3) Ti ⁴⁺	(4) Sc^{3+}				
Ans.	(2)							
53.	The basic character of	f the transition metal monox	ides follows the order (At	omic nos. Ti = 22, V = 23, Cr = 24, Fe = 26)				
	(1) VO > CrO > TiO >	>FeO	$(2) \operatorname{CrO} > \operatorname{VO} > \operatorname{Fee}$	O>TiO				
	$(3) \operatorname{TiO} > \operatorname{FeO} > \operatorname{VO} >$	> CrO	$(4)\mathrm{TiO} > \mathrm{VO} > \mathrm{CrO}$	O>FeO				
Ans.	(4)							

54.	The correct order of ionic radii of Y^{3+} , La^{3+} , Eu^{3+} and Lu^{3+} is (Atomic nos. $Y = 39$, $La = 57$, $Eu = 63$, $Lu = 71$)					
	(1) $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$	3+	(2) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$	3+		
	(3) $Lu^{3+} \le Eu^{3+} \le La^{3+} \le Y^{3+}$ (4) $La^{3+} \le Eu^{3+} \le Lu^{3+} \le Y^{3+}$					
Ans.	(2)					
55. Among the following series of transition metal is $(At. Nos. Ti = 22, V = 23, Cr = 24, Mn = 25]$			the one where all metal ions	s have 3d ² electronic configuration is		
	(1) Ti ³⁺ , V ²⁺ , Cr ³⁺ , Mn ⁴⁺		(2) Ti ³⁺ , V ⁴⁺ , Cr ⁶⁺ , Mn ⁷⁺			
	(3) Ti^{4+} , V^{3+} , Cr^{2+} , Mn^{3+}		(4) Ti ²⁺ , V ³⁺ , Cr ⁴⁺ , Mn ⁵⁺			
Ans.	(4)					
56.	Lanthanoids are					
	(1) 14 elements in the sixth period (atomic number 90 to 103) that are filling 4f sublevel					
	(2) 14 elements in the s	eventh period (atomic num	ber 90 to 103) that are filling	ng 5f sublevel		
	(3) 14 elements in the s	3) 14 elements in the sixth period (atomic number = 58 to 71) that are filling the 4f sublevel				
	(4) 14 elements in the seventh period (atomic number = 50 to 71) that are filling 4f sublevel					
Ans.	(3)					
57.	Which of the following statement is not correct					
	(1) $La(OH)_2$ is less basic than $Lu(OH)_3$					
	(2) In lanthanide series ionic radius of Lu^{+3} ion decreases					
	(3) La is actually an element of transition series rather lanthanides					
	(4) Automatic radius of	Zr and Hf are same because	e of lanthanide contraction			
Ans.	(1)					
58.	Out of $\operatorname{TiF}_6^{2-}$, $\operatorname{CoF}_6^{3-}$, Cu	l_2Cl_2 and NiCl ₄ ²⁻ (Z of Ti = 2	21, $Co = 27$, $Cu = 29$, $Ni = 23$	8) the colourless species are		
	(1) CoF_6^{3-} and NiCl_4^{2-}		(2) TiF_6^{2-} and CoF_6^{3-}			
	(3) Cu_2Cl_2 and $NiCl_4^{2-}$		(4) TiF_6^{2-} and Cu_2Cl_2			
Ans.	(4)					
59.	Which one of the element states ?	s with the following outer or	bital configurations may exl	hibit the largest number of oxidations		
	$(1) 3d^24s^2$	(2) $3d^34s^2$	$(3) 3d^{5}4s^{1}$	$(4) 3d^{5}4s^{2}$		
Ans.	(4)					
60.	The highest possible ox	idation state shown by osm	ium in its compound is			
	(1)+4	(2)+8	(3)+6	(4)+10		
Ans.	(2)					

ASSERTION & REASON QUESTIONS

These questions consist of two statements each, printed as *Assertion* and *Reason*. While answering these Questions you are required to choose any one of the following four responses.

- A. If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- B. If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- C. If Assertion is True but the Reason is False.
- D. If both Assertion & Reason are False.

1.	Assertion	:	1 st ionisation potential of mercury is greater than cadmium
	Reason	:	Hg has stable electronic configuration (5d ¹⁰ 6s ²)
Ans.	(B)		
2.	Assertion	:	Zr and Hf have about the same atomic radius.
	Reaon	:	Zr and Hf lies in the same group.
Ans.	(B)		
3.	Assertion	:	Zn, Cd, Hg are transition metal.
	Reason	:	Outer most shall is completely filled in Zn, Cd, Hg
Ans.	(C)		
4.	Assertion	:	Cu ⁺ is more stable than Cu ⁺²
	Reason	:	Δ IP is greater than 16 eV
Ans.	(D)		
5.	Assertion	:	In magentic field weight of MnSO ₄ increases
	Reason	:	$MnSO_4$ is paramagnetic
Ans.	(A)		
6.	Assertion	:	KMnO ₄ is dark pink coloured compound
	Reason	:	In the KMnO ₄ charge transfer spectrum occurs.
Ans.	(A)		
7.	Assertion	:	Hg is the only metal which is liquid at 0°C.
	Reason	:	It has very high IP and weak metallic bond
Ans.	(A)		
8.	Assertion	:	Valency of transition elements is variable
	Reason	:	Energy of ns and $(n-1)d$ orbital is almost same.
Ans.	(A)		
9.	Assertion	:	Melting point of Mn less than that of Fe
	Reason	:	Mn has less number of unpaired e- than Fe in atomic state
Ans.	(C)		
10.	Assertion	:	Solution of Na ₂ CrO ₄ in water is intensely coloured.
	Reason	:	Ox. state of Cr in Na_2CrO_4 is +6.
Ans.	(B)		

11.	Assertion	:	Ce ⁺⁴ acts as oxidising agent in aqueous medium
	Reason	:	+4 is common oxidation state of lanthanides
Ans.	(C)		
12.	Assertion	:	Neptunium is transuranic element.
	Reason	:	It is heavier than uranium
Ans.	(A)		
13.	Assertion	:	$La(OH)_3$ is more basic than $Lu(OH)_3$
	Reason	:	Lanthanum is d-block element
Ans.	(B)		
14.	Assertion	:	Actinides show much higher range of oxidation states
	Reason	:	Energy difference between 5f and 6d orbitals is large
Ans.	(B)		
15.	Assertion	:	All the lanthanide elements exhibits a common oxidation state of $+3$ in their compounds.
	Reason	:	The atoms of the lanthanide elements contains three electron in their outermost shell.
Ans.	(C)		
16.	Assertion	:	$K_2 Cr_2 O_7$ is used as a primary standard in volumetric analysis. [AIIMS-2006]
	Reason	:	It has a good solubility in water.
Ans.	(C)		
17.	Assertion	:	Change in colour of acidic solution of potassium dichromate by breath is used to test drunk drivers.
	Reason	:	Change in colour is due to the complexation of alcohol with potassium dichromate.
Ans.	(C)		
18.	Assertion	:	Eu ²⁺ & Yb ⁺² are reducing agent for their ions.
	Reason	:	Both ions have stable half filled configuration.
Ans.	(C)		