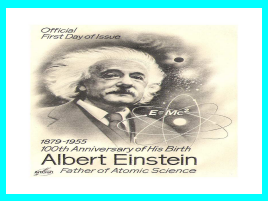

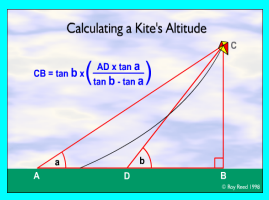

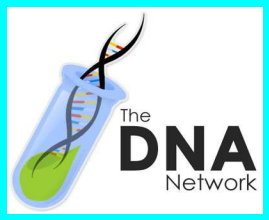

IIT-JAM - CHEMISTRY

MOCK TEST PAPER(According to new pattern)

- **PART-I** Consists of 35 objective type questions. The first ten questions are Multiple choice Questions which carry one mark each and the rest of the 25 question are Multiple Select questions which carry two marks each. There will be negative marks for wrong answers. For each 1 mark question the negative mark will be 1/3 and for each 2 mark question it will be 2/3.
- **Part-II** Consists of 8 Numerical answer type (NAT) questions each carrying five marks. For each NAT type question, the answer is a signed real number

- *Total marks : 100*
- *Duration of test : 3 Hours*

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PART-I Multiple Choice Questions (MCQ)

1. Which of the following oxyacids of chlorine is the best oxidizing agent?

(A) HOCl

(B) $HClO_2$

(C) $HClO_3$

(D) $HClO_4$

2. Which halogen does not show +1 oxidation state?

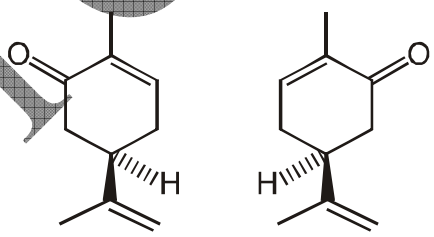
(A) Chlorine

(B) Bromine

(C) Iodine

(D) Fluorine

3. The two compounds shown in the Figure below are



(A) Diastereomers

(B) Enantiomers

(C) Epimers

(D) Regioisomers

4. If the shortest wavelength of the spectral line of H-atom in the Lyman series is x, then the longest wavelength of the line in Balmer series of Li^{2+} is

(A) $\frac{5x}{4}$

(B) $\frac{4x}{5}$

(C) $\frac{x}{9}$

(D) 9x

5. How many gram of Potassium chlorate ($KClO_3$) should be heated to produce 2.24 lit. O_2 at NTP.

(A) 24.5 gm

(B) 2.45 gm

(C) 81.6 gm

(D) 8.16 gm

6. An acidic indicator shows 40% ionization and its ionization constant is 10^{-5}. The pH of the indicator

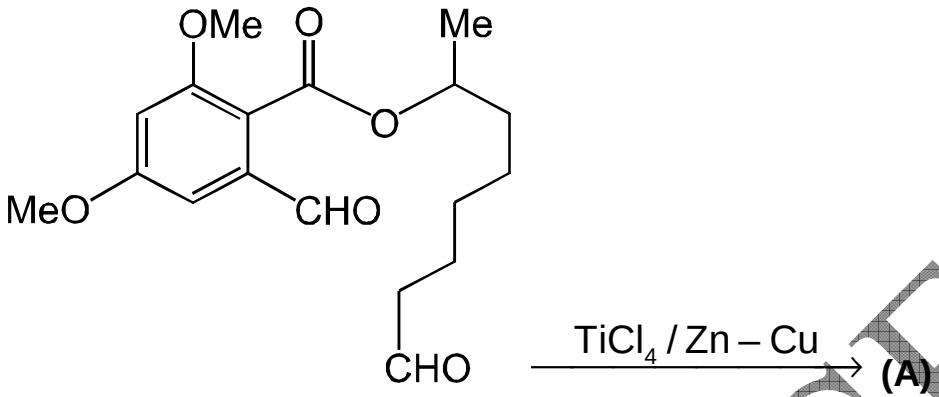
(A) 5.0

(B) 5.17

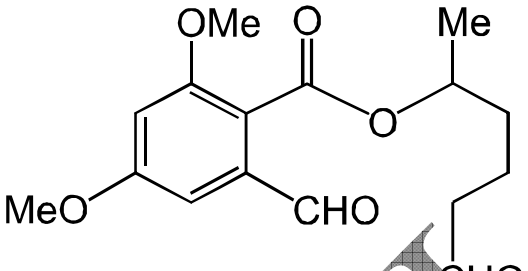
(C) 4.83

(D) 4.70

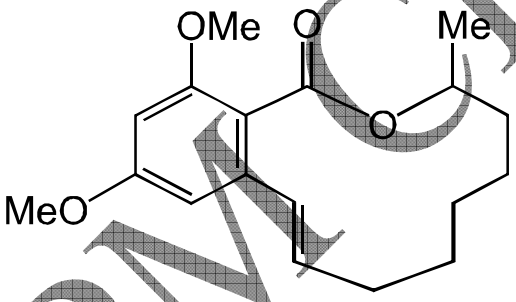
7.



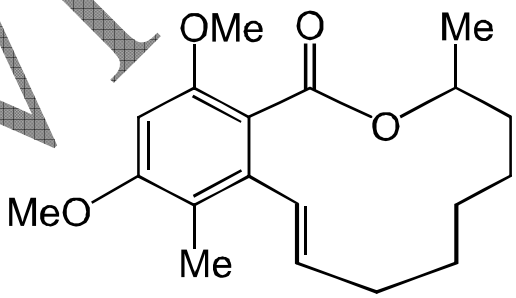
A is



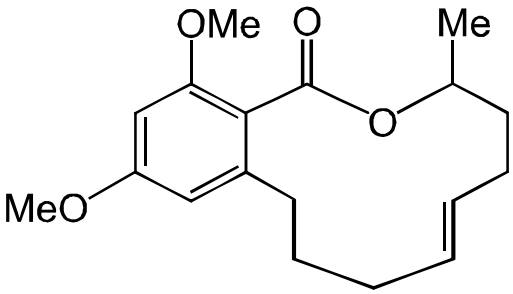
(A)



(B)

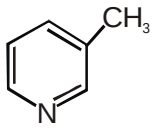


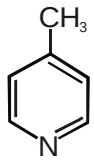
(C)

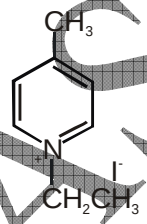


(D)

8. Rank the following compounds in order of decreasing ease of removing a proton from a methyl group.

(I) 

(II) 

(III) 

(A) I > II > III

(B) II > III > I

(C) III > II > I

(D) III > I > II

9. In an aqueous solution of volume 500 mL when the reaction of $2Ag^{+} + Cu \rightleftharpoons Cu^{2+} + 2Ag$ reached equilibrium the $[Cu^{2+}]$ was x M. When 500 mL of water is further added, at the equilibrium $[Cu^{2+}]$ will be :

(A) 2 x M

(B) x M

(C) Between x M and x/2 M

(D) Less than x/2 M

10. From the following data, the activation energy for the reaction (cal/mol) :

$H_2 + I_2 \longrightarrow 2HI$

T, K	1/T, K^{-1}	$\log_{10}K$
769	$1{\cdot}3 \times 10^{-3}$	2·9
667	$1{\cdot}5 \times 10^{-3}$	1·1

(A) 4×10^4

(B) 2×10^4

(C) 8×10^4

(D) 3×10^4

PART-I Multiple Select Questions (MSQ)

11. The structure could not exist in $XeOF_4$

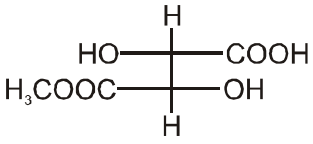
(A) Penta gonal planer

(B) Octahedral

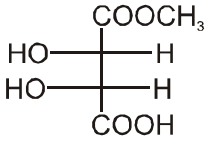
(C) Squarepyramidal

(D) Trigonal bipyramidal

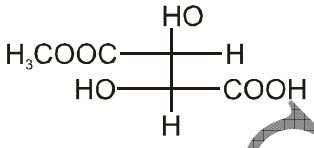
12. The incorrect relation between (1), (2), (3) are:



(1)



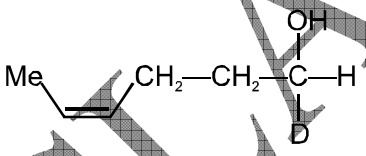
(2)



(3)

	Identical	Diastereomer	Enantiomer
(A)	1, 2	2, 3	
(B)		1, 2	2, 3
(C)	1, 2		2, 3
(D)	2, 3	1, 3	

13. The incorrect stereochemical descriptions for the structure given below are:



(A) 1S, 4E

(B) 1R, 4E

(C) 1R, 4Z

(D) 1S, 4Z

14. Identify the complexes which are unexpected to the coloured.

(A) $[Ti(NO_3)_4]$

(B) $[Cu(NCCH_3)]^+ BF_4$

(C) $[Zn(H_2O)_6]^{2+}$

(D) $K_3[VF_6]$

15. A solution when diluted with H_2O and boiled gives a white precipitate. On addition of excess NH_4Cl/NH_4OH, the volume of precipitate decreases leaving behind a white gelatinous precipitate. Identify the precipitate which does not dissolves in NH_4OH/NH_4Cl.

(A) $Zn(OH)_2$

(B) $Al(OH)_3$

(C) $Mg(OH)_2$

(D) $Ca(OH)_2$

16. Which of the following are not anhydride of $HClO_4$?

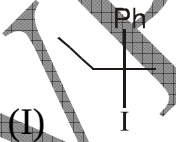
(A) Cl_2O

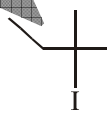
(B) ClO_2

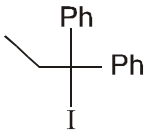
(C) Cl_2O_5

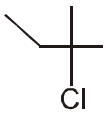
(D) Cl_2O_7

17. Which of the following order of decreasing rate of S_N1 reaction is incorrect?

(I) 

(II) 

(III) 

(IV) 

(A) III > I > II > IV

(B) III > I > IV > II

(C) I > III > IV > II

(D) I > III > II > IV

18. The following statement is false-

(A) $(A^T)^{-1} = (A^{-1})^T$

(B) $(A^T)^{-1} = (A^T)$

(C) $(A^T)^{-1} = A^{-1}$

(D) All of these

19. Alkali metals do not impart colour to the Bunsen flame due to —

(A) Low melting point

(B) Softness

(C) ns' electronic configuration

(D) Low ionization energy

20. A binary salt (X) of alkali metal on heating with sulphur give (Y); (Y) with $BaCl_2$ solution gave white ppt. (Z) insoluble in conc. HCl. 14.2 g of (X) gave 23.3 g of (Z). X will not be —

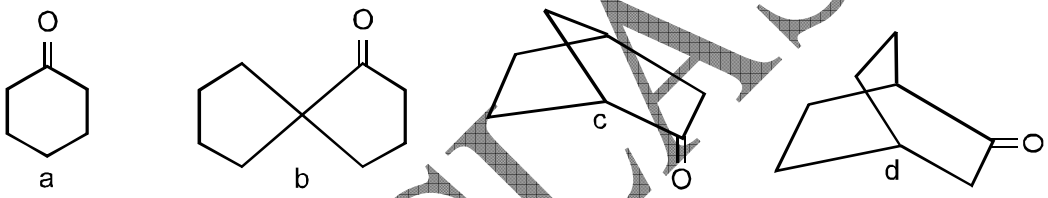
(A) CsCl

(B) KO_2

(C) NaCl

(D) Na_2CO_3

21. Which of the following compounds is optically inactive ?



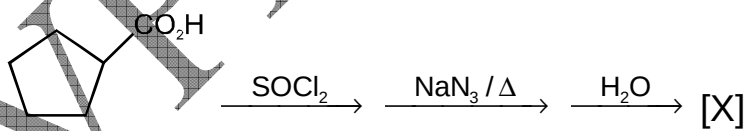
(A) a

(B) b

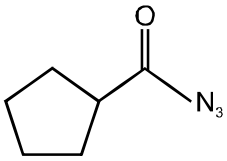
(C) c

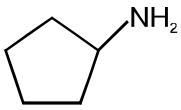
(D) d

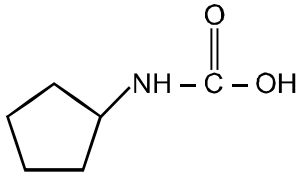
22. In given reaction

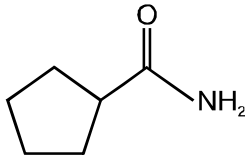


The product [X] will not be

(A) 

(B) 

(C) 

(D) 

23. In benzoin condensation electron attracting group on donor retards the reaction because they do not —

(A) Increase nucleophilicity of carbanion

(B) Decrease nucleophilicity of carbanion

(C) Increase the electrophilicity of acceptor atom.

(D) Decrease the electrophilicity of acceptor atom.

24. The normalized wave function of 1s orbital is:-$\psi = \sqrt{N}e^{-\frac{Zr}{a_0}}$

and the radial distribution function is = $4\pi r^2\psi^2$; Where $N = \frac{Z^3}{\pi a_0^3}$

The most probable distance at which the 1s electron of hydrogen-like atom with atomic number Z is to be found will not be ,

(A) $\frac{a_0}{2Z}$

(B) $\frac{a_0}{Z}$

(C) $\frac{2a_0}{Z}$

(D) $\frac{4a_0}{Z}$

25. 1.0 g Mg atoms in the vapour phase absorb 50.0 kJ of energy. Mole % of Mg^{2+} will not be

$Mg(g) \longrightarrow Mg^{+}(g) + e^{-}$ $\Delta H = 740\ kJ\ mol^{-1}$

$Mg+(g) \longrightarrow Mg^{2+}(g) + e^{-}$ $\Delta H = 1450\ kJ\ mol^{-1}$.

(A) 68.27%

(B) 31.73%

(C) 15.06%

(D) None

26. Choose the incorrect statement about the following,

$\Delta G^{\circ}_{f}(298K)/kJ\ mol^{-1}\ Al_2O_3(s) = -1582$ $Na_2O(s) = -377$, element = 0

(A) It is possible for sodium to reduce aluminium oxide to aluminium at 298 K.

(B) The reaction is slow

(C) The reaction is fast

(D) The reaction cannot occur

27. Which is true statement about FeO.

(A) It is basic oxide.

(B) Its aqueous solution changes to $Fe(OH)_3$ and then to $Fe_2O_3(H_2O)_n$ by atmospheric oxygen.

(C) It is stoichiometric and is metal deficient.

(D) None of these

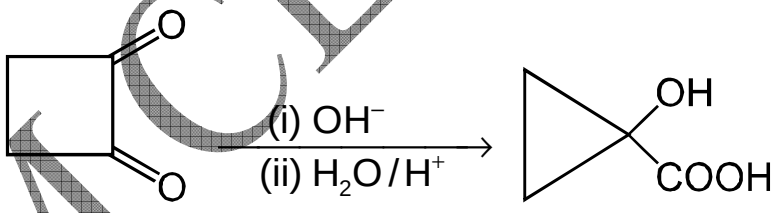
28. Which of the following compounds is not amphoteric.

(A) Sc_2O_3

(B) TiO

(C) $Fe(OH)_3$

(D) VO_2

29. The reaction, 

is not an example of

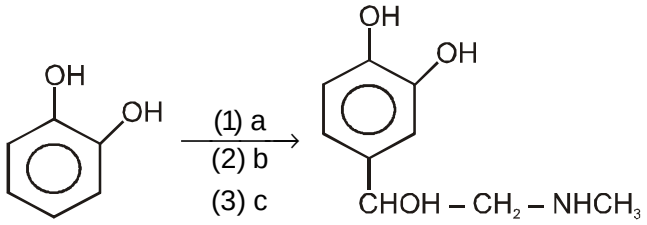
(A) Wolff rearrangement

(B) Benzylic acid rearrangement

(C) Stefans rearrangement

(D) Wagner-Meerwein rearrangement

30. The reagents used for the following transformation of catechol into adrenaline alkaloid are not-



(A) $ClCH_2 - COOH + POCl_3, CH_3NH_2, H_2 - Pd$

(B) $Cl - CH_2 - \underset{\underset{O}{\|}}{C} - Cl$, $CH_3CH_2NH_2, H_2 - Pd$

(C) $CH_3COCl, AlCl_3, \overset{Cl_2/OH^{\ominus}}{}, CH_3NH_2$

(D) $Cl_2/H_2O, CH_3CH_2MgCl, NH_3$

31. Henderson equation are -

(A) $pH = pK_a - \log \frac{[Acid]}{[Salt]}$

(B) $pH = pK_a + \log \frac{[Salt]}{[Acid]}$

(C) $pH = pK_a - \log \frac{[Salt]}{[Acid]}$

(D) None of these

32. Which one of the following statements is incorrect? With dilution, the equivalent conductance of

(A) Both strong and weak electrolytes decreases

(B) Strong electrolyte increases while that of weak electrolyte decreases

(C) Strong electrolyte decreases while that of weak electrolyte increases

(D) Both strong and weak electrolytes increases

33. What would not happen to the cell emf if NH_3 were added to the silver cell and $Ag(NH_3)_2^+$ is formed?

(A) No change

(B) Increases

(C) Decreases

(D) None of these

34. The hydrolysis of ester was carried out separately with 0·05 N HCl and 0·05 N H_2SO_4. Which of the following will be False –

(A) $K_{HCl} > K_{H_2SO_4}$

(B) $K_{H_2SO_4} > K_{HCl}$

(C) $K_{H_2SO_4} = 2K_{HCl}$

(D) $K_{H_2SO_4} = K_{HCl}$

35. Isostructural pair amongst the following is –

(A) XeF_2, Br_3^-

(B) XeF_4, PF_4^+

(C) CO_2 , I_3^-

(D) MnO_4^- , ClO_3^-

PART-II Numerical Answer Type (NAT) Questions

36. 8 mole of a gas AB_3 are introduced into a 1·0 dm^3 vessel. It dissociates as, $2AB_3(g) \rightleftharpoons A_2(g) + 3B_2(g)$. At equilibrium, 2 mole of A_2 are found to be present. The equilibrium constant of reaction is ..... in mol^2L^{-2}.

37. The quantum number 'n' corresponding to the excited state of He^+ ion is _____, if on transition to the ground state, the ion emits two photons in succession with wavelength 108.5 and 30.4 nm.

38. The wavelength of radiation emitted when electron falls from 4th Bohr's orbit to 2nd in H atom is _____. (R_H = 1·09678 × 10^{-7} m^{-1})

39. The square matrix A have an inverse iff $|A| \neq$ _____

40. 1,4-disubstituted cyclohexane has _____ number of achiral compounds and _____ number of meso compounds.

41. Two glass bulb A and B are connected by a very small tube (of negligible volume) having stop cock. Bulb A has a volume of 100 cm^3 and contains gas while bulb B is empty. On opening the stop cock, the

pressure in 'A' fell down by 60%. The volume of bulb B must be _____.

42. EAN of Mn in $Mn_2(CO)_5$ is

43. Primary and secondary valency of Pt in $[Pt(NH_3)_3Cl_3]Cl$ is_____.

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A	D	B	B	D	C	B	C	D	A	A,B,D	A,C,D	A,B,D	A,B,C	B,C,D
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	A,B,C	A,B,C	B,C	A,B,C	A,C,D	A,B	A,C,D	A,C,D	A,C,D	A,C	A,B,C	A,B,D	A,B,C	A,C,D	A,C,D
Ques.	31	32	33	34	35	36	37	38	39	40	41	42	43		
Ans.	A,B	A,B,C	A,B	A,C,D	A,B,C	27	5	486	0	2	150	36	2,6		

HINT AND SOLUTION

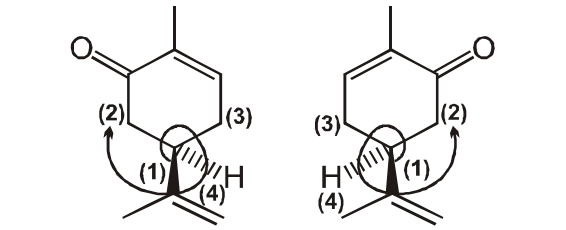
1.(A) Oxidising power $\propto$ 1/oxidation number of Halogen

	HOCl		$HClO_2$		$HClO_3$		$HClO_4$
O.No.	+1	<	+3	<	+5	<	+7

Oxidising power $HOCl > HClO_2 > HClO_3 > HClO_4$

In oxyacids of the same Halogen in different oxidation states, the thermal stability increase while oxidizing power decreases with increase of O.No. of the chlorine atom.

2.(D) Fluorine being most electronegative always shows –1 oxidation state.



Carvone = R **S = Carvone**

Enantiomers

3. (B)

Both compound contain only one chiral carbon with different configuration,So these are enantiomers.

4.(B) Shortest wavelength of H atom (Lymen series) = x

longest wavelength of the line in Balmer series of Li^{+2}

$$\frac{1}{\lambda} = RZ^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

$$\frac{1}{\lambda} = R9\left[\frac{1}{(2)^2} - \frac{1}{(3)^2}\right]$$

$$\frac{1}{\lambda} = R9\left[\frac{5}{36}\right]$$

$$\lambda = \frac{4}{5}x$$

5.(D) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$

K Cl O_3

$\downarrow$ $\downarrow$ $\downarrow$

$\underbrace{39 + 35.5 + 48}$

mol. wt. = 122.5

$\underbrace{245\text{ gm}}$

$\Downarrow$

$2 \times 122.5 = {}^{2KClO_3}$

3×22.4 lit. O_2 obtained from 245 gm $KClO_3$

2.24 lit. O_2 ..... $\frac{245}{3\times 22.4} \times 2.24 = 8.16$ gm

6.(C) Let an acidic indicator, HI_n

$HI_n \rightleftharpoons H^+ + I_n^-$

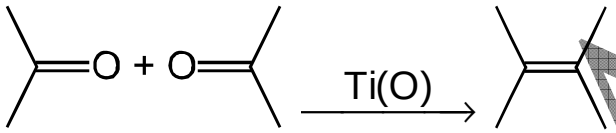
$KI_n = \frac{[H^+][I_n^-]}{[HI_n]}$ KI_n = Ionization const.

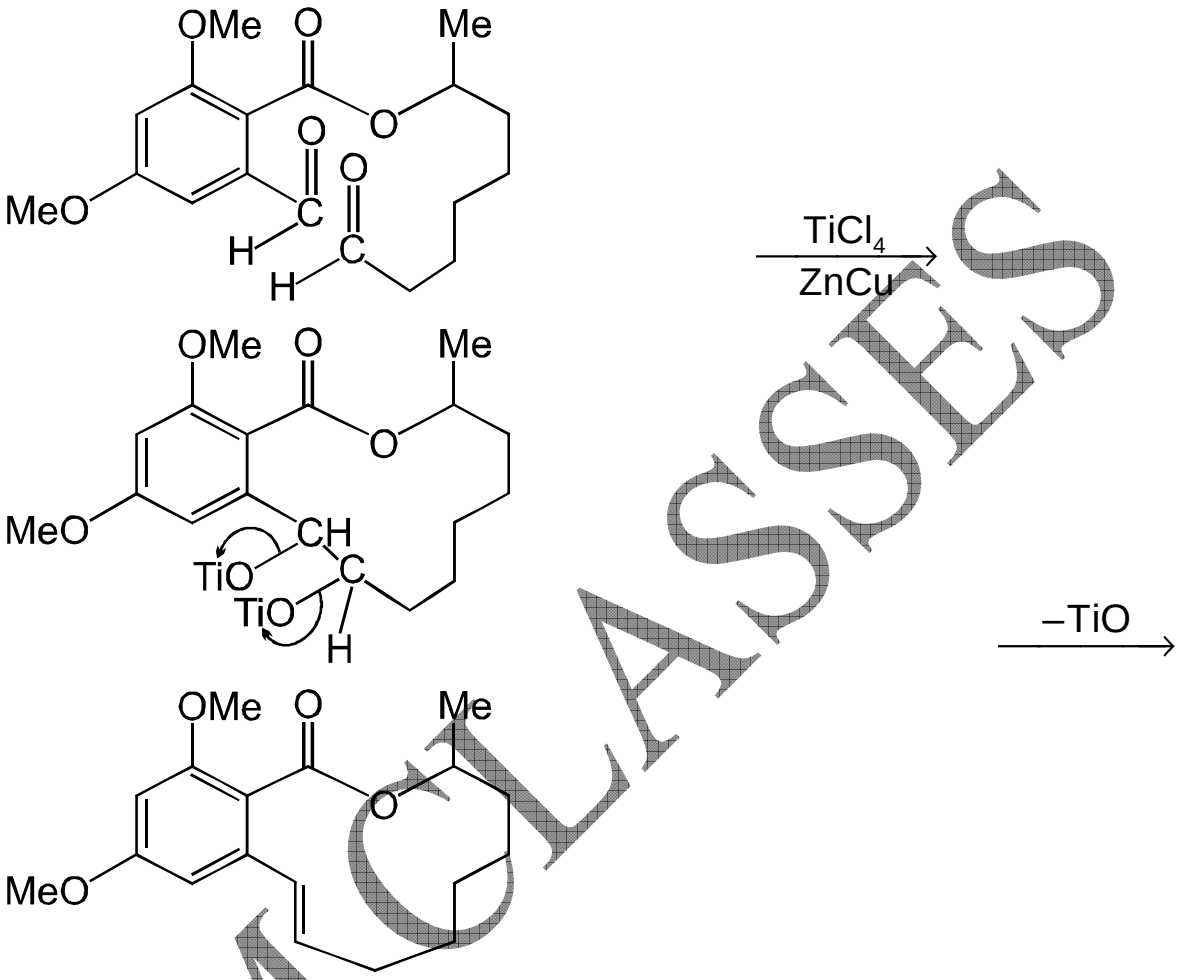
$$[H^+] = \frac{KI_n[\text{Unionised}]}{[\text{Ionised}]}$$

$$pH = pKI_n + \log\frac{[\text{Ionised}]}{[\text{Unionised}]} \qquad KI_n = 10^{-5} \quad \text{or} \quad pKI_n = 5$$

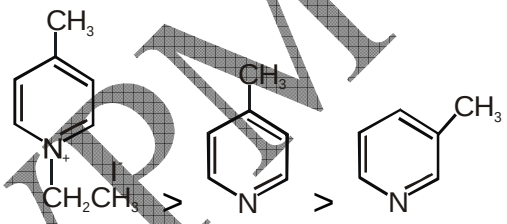
$$pH = 5 + \log\frac{40}{60} = 5 + \log 2 - \log 3 = 4.83$$

7.(B) Mc murry reaction : reductive dimerization of carbonyl compound on treatment with low valent titanium.





8. (C)



9.(D) $[Cu^{+2}]$

$xM \times 500\ ml = M \times 1000\ ml$

$$M = \frac{xM \times 500}{1000} = \frac{xM}{2}$$

At equilibrium the concentration of $[Cu^{+2}]$ will be less than $\frac{x}{2}$ M.

10.(A) $\log K = \log A - \frac{E_a}{RT}$

$2{\cdot}9 = \log A - \frac{E_a}{2{\cdot}303R \times 769}$ ..... (i)

$1{\cdot}1 = \log A - \frac{E_a}{2{\cdot}303R \times 667}$ ..... (ii)

Eqs. (i) – (ii)

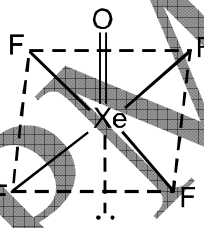
$1{\cdot}8 = \frac{E_a}{R}\left[\frac{1}{667} - \frac{1}{769}\right]$

$1{\cdot}8 = \frac{E_a}{R}\frac{[769 - 667]}{667 \times 769 \times 2{\cdot}303}$

$\therefore \quad E_a = 4{\cdot}17 \times 10^4$ cal mol

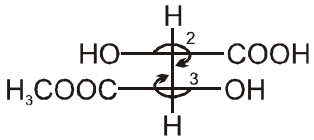
11. (A,B,D) $XeOF_4$ have 1 lone pair.

$XeOF_4$ — sp^3d^2 Hybridisation [b.p.'s 5; l.p. 1]



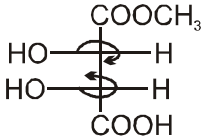
Square pyramidal

12.(A,C,D) (1)



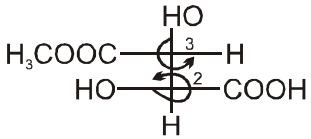
(2R, 3R)

(2)

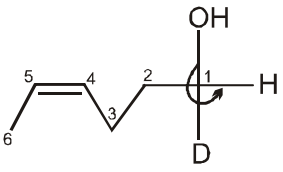


(2R, 3S)

(3)



(2S, 3R)

13.(A,B,D) 

1R, 4Z

14. (A,B,C) (i) In $[Ti(NO_3)_4]$ O.N. of Ti is +4

Hence, in Ti(IV) $(1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6)$

incomplete d-orbital is not present. So it is colourless.

(ii) In $[Cu(NCCH_3)]^+ BF_4^-$, O.N. of Cu is +1

Hence, in Cu (I) $[1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6\ 3d^{10}]$

incomplete d-orbital is not present, so it is also colourless.

(iii) $[Zn(H_2O)_6]^{2+}$ O.N. of Zn is +2. $[3d^{10}]$ incomplete d-orbital is not present. So it is colourless.

(iv) In $K_3[VF_6]$, O.N. of V is +3.

Hence, V(III) $(1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6\ 3d^2)$

incomplete d-orbital is present so it is coloured.

15. (B,C,D) A solution of Zn^{2+} ion reacts with water, which on boiling give white ppt. of $Zn(OH)_2$. This precipitate dissolve in excess of NH_4OH in presence of NH_4Cl because $Zn(OH)_2$ on reaction with NH_4OH in presence of NH_4Cl forms tetramine zinc (II) complex (soluble).

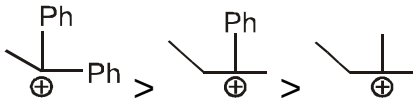
$$Zn^{2+} + 2H_2O \longrightarrow \underset{\text{White ppt.}}{Zn(OH)_2\downarrow} + 2H^+$$

$$Zn(OH)_2 + 4NH_4OH \xrightarrow{NH_4Cl} \underset{\substack{\text{Complex ion}\\(\text{soluble})}}{[Zn(NH_3)_4]^{2+}} + 4H_2O + 2OH^-$$

16.(A,B,C) $2HClO_4 \xrightarrow{-H_2O} Cl_2O_7$

Cl_2O_7 is the anhydride of $HClO_4$.

17.(A,B,C) (SN^1) Rate α C^+ stability



18.(B,C) $AA^{-1} = A^{-1} A = I$

$(AA^{-1})^T = (A^{-1} A)^T = I^T$

$(A^{-1})^T A^T = (A)^T (A^{-1})^T = I$

$(A^{-1})^T$ is the inverse of A^T

$(A^{-1})^T = (A^T)^{-1}$.

19.(A.B,C) Due to low IE, the outermost electron in alkali metals can be easily excited to higher energy levels by absorbing energy from the flame. When the excited electron falls back to the ground state it gives out energy in the form of visible light and imparts colour to the flame.

20.(A,C,D) $2KO_2 + S \longrightarrow K_2SO_4 \xrightarrow{BaCl_2} BaSO_4$

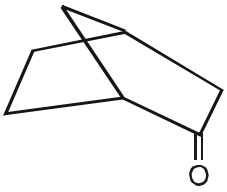
(X) **(Y)** **(Z)**

2×71 g 233 g

$\because$ 142 g KO_2 give 233 g $BaSO_4$

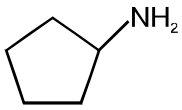
$\therefore$ 14.2 g KO_2 give 23.3 g $BaSO_4$

21. (A,B)

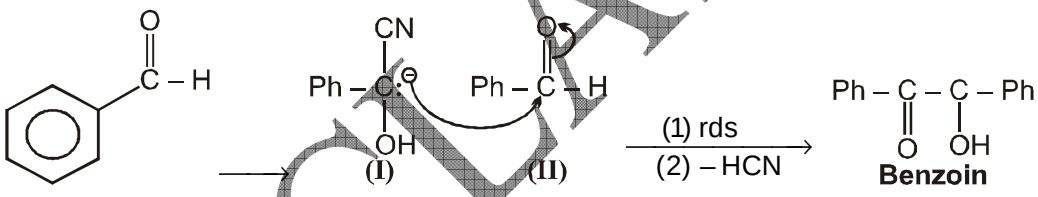


It does not contain plane of symmetry and centre of symmetry. So it is optically active.

22.(A,C,D)



23.(A,C,D)



Electron attracting group decreases nucleophilicity (e^- density) at donor (I). So decreases the rate of reaction.

24.(A,C,D) $\frac{d}{dr}[4\pi r^2 Ne^{-2Zr/a_0}] = 0$

$$4\pi Ne^{-2Zr/a_0}(2r) + 4\pi r^2 Ne^{-2Zr/a_0}\left(\frac{-2Z}{a_0}\right) = 0$$

$$8\pi r Ne^{-2Zr/a_0}\left[1 - \frac{rZ}{a_0}\right] = 0$$

$$r = \frac{a_0}{Z}$$

25.(A,C) We have been given first and second ionization potentials of Mg(g).

Amount of Mg(g) = $\frac{1.0}{24}$ = 4.167×10^{-2} mol

Energy required to form Mg^+ = $4.167 \times 10^{-2} \times 740 = 30.83$ kJ

Energy left to form Mg^{2+} from Mg+ = 50 – 30.83 = 19.17 kJ

hence, Mg^{2+} formed = $\frac{19.17}{1450}$ = 1.322×10^{-2} mol

Mg^+ formed = $4.167 \times 10^{-2} - 1.322 \times 10^{-2} = 2.845 \times 10^{-2}$ mol

$\therefore$ Mole percentage of Mg^+ = $\frac{2.845 \times 10^{-2}}{4.167 \times 10^{-2}} \times 100$ = **68.27%**

Mole percentage of Mg^{2+} = **31.73%**

26.(A,B,C) The reaction is

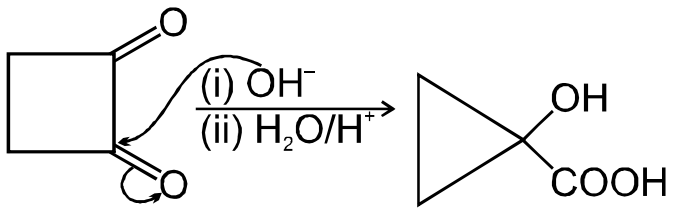
$$Al_2O_3(s) + 6Na(s) \rightarrow Na_2O(s) + 2Al(s)$$ hence,

$$\Delta G^\circ = 3\Delta G^\circ_f(Na_2O) - \Delta G^\circ_f(Al_2O_3) = 3 \times (-377) - (-1582) = +451\,kJmol^{-1}$$

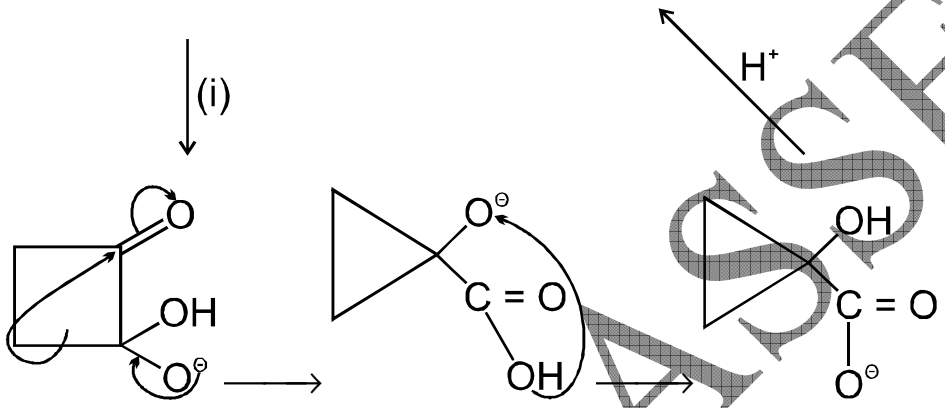
Evidently the reaction cannot occur since $\Delta G^\circ(298K)$ is positive.

27.(A,B,D) FeO is non stoichiometric and is metal deficient.

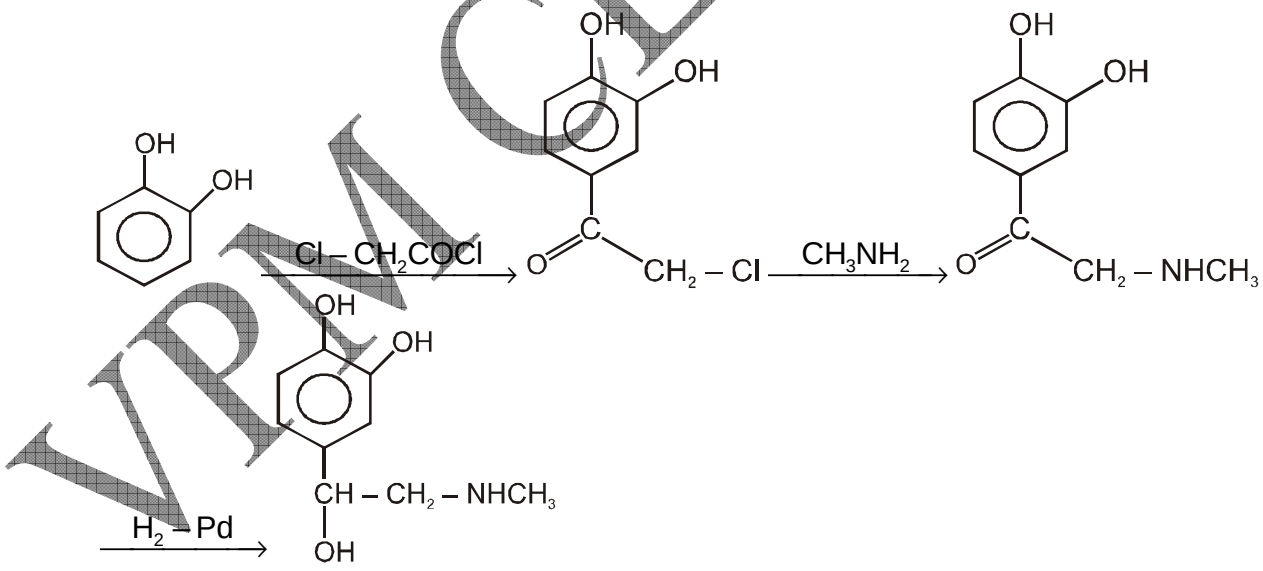
28.(A,B,C) VO_2 is amphoteric in nature.



29.(A,C,D) **Vic dicarbonyl** **α-hydroxy acid**



30.(A,C,D)



31.(A,B) Both (A) and (B) are correct.

32.(A,B,C) Λ_{eq} increases with dilution for both strong and weak electrolytes.

33.(A,B) $Ag^+ + 2NH_3 \rightarrow Ag(NH_3)_2^+$

NH_3 reduces Ag^+ concentration; thereby drives the reaction to the left and decreases the cell emf.

34.(A,C,D) H_2SO_4 is stronger than HCl

Also relative strength of two acids = $\frac{\text{rate constant by } H_2SO_4}{\text{rate constant by HCl}}$ or $\frac{K_{H_2SO_4}}{K_{HCl}} > 1$ –

35.(A,B,C) XeF_4 : square planar (sp^3d^2) ; PF_4^+ : tetrahedral (sp^3)

36.

$2AB_3$	$\rightleftharpoons$	$A_2(g)$	+	$3\ B_2(g)$
8		0		0
(8 – x)		$\frac{x}{2}$		$\frac{3x}{2}$

$\therefore \frac{x}{2} = 2$ $\quad\therefore\ x = 4$

Also, V = 1 dm^3 = 1 litre

Now, $K_C = \frac{[B_2]^3[A_2]}{[AB_3]^2} = \frac{(6)^3 \times 2}{(4)^2} = 27$

37. [5]

Energy difference between ground and excited state of He^+ = Sum of energy of two photons

$$(E_n - E_1) = hc\left[\frac{1}{\lambda_1} + \frac{1}{\lambda_2}\right] \quad ...(i)$$

$$E_n = -\frac{Z^2}{n^2} \times 21.69 \times 10^{-19}\ J = -\frac{4}{n^2} \times 21.69 \times 10^{-19}\ J$$

From (i)

$$4 \times 21.69 \times 10^{-19}\left(1 - \frac{1}{n^2}\right) = 6.626 \times 10^{-34} \times 3 \times 10^8\left[\frac{10^9}{108.5} + \frac{10^9}{30.4}\right]$$

On solving, we get n = 5

38. 486 nm

$$\frac{1}{\lambda} = R_H \times \left[\frac{1}{2^2} - \frac{1}{4^2}\right] = 4.86 \times 10^{-7}\ m = 486\ nm$$

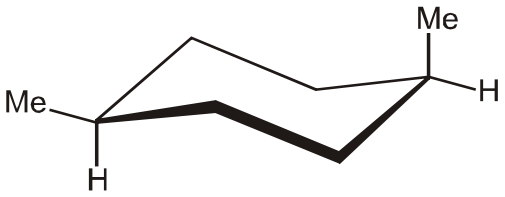
39. 0

A^{-1} exist $\Leftrightarrow$ A is non-singular i.e. $|A| \neq 0$.

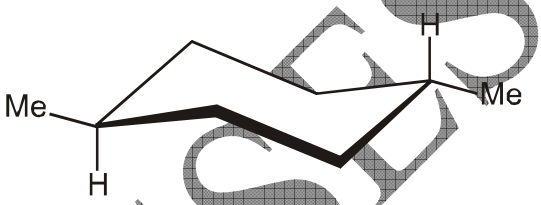
40. [2, 0]

A 1, 4-disubstituted cyclohexane can exist in only two forms – a *trans*-compound with both groups equatorial (these could as well be diaxial in a less stable conformer) and a *cis*-compound with one substituent axial

while other equatorial. Both *cis* as well as *trans* compounds are achiral due to the presence of plane of symmetry. The *cis* and *trans* compounds are diastereomers, none has any stereocenter and none is *meso*. Both are achiral due to the presence of plane of symmetry.



***cis*-1, 4-Dimethylcyclohexane**



***trans*-1, 4-Dimethylcyclohexane**

41. [150 mL]

Let the original pressure in A be P

Final pressure = $\frac{40P}{100}$ (∵ Pressure fell down by 60%)

Let volume of bulb B = V mL

Total volume after opening the stop cock = (100 + V)

By Boyle's law,

$$100 \times P = (100 + V) \times \frac{40P}{100}$$

or $(100 + V) = \frac{100 \times 100}{40} = 250$

or V = 250 – 100 = **150 mL**

42. Electrons from each Mn atom = 25X2=50

Electrons from 10(CO) = 10× 2 = 20

Electron from Mn-Mn bond =2

EAN of Mn in $Mn_2(CO)_{10}$ =72/2 =36

43. $[Pt(NH_3)_3Cl_3]Cl$

Primary valency = 2

Secondary valency = 6