

# Chemistry

**TARGET : JEE 2013**

## Home Assignment # 01



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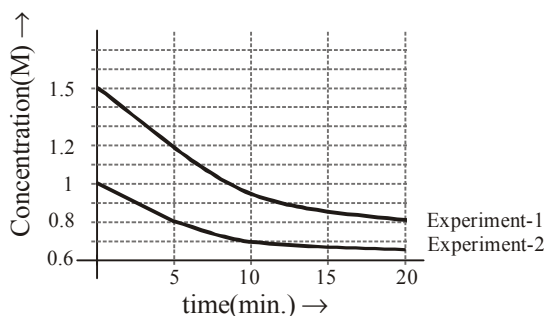
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- Q.9 The variation of concentration of A with time in two experiments starting with two different initial concentration of A is given in the following graph. The reaction is represented as  $A(aq) \longrightarrow B(aq)$ . What is the rate of reaction (M/min) when concentration of A in aqueous solution was 1.8 M?



- (A)  $0.072 \text{ M min}^{-1}$       (B)  $0.036 \text{ M min}^{-1}$       (C)  $0.08 \text{ M min}^{-1}$       (D)  $1 \text{ M min}^{-1}$
- Q.10 For the given reaction -  
 $A \rightarrow B$  ; rate constant =  $10^{-2} \text{ min}^{-1}$   
 After what time ratio of concentration of A to B will become  $10^3 : 1$   
 (A) 6 sec      (B) 20 sec      (C) 30 sec      (D) 40 sec
- Q.11 For the first order reaction  $A \longrightarrow B + C$ , carried out at  $27^\circ \text{C}$  if  $3.8 \times 10^{-16} \%$  of the reactant molecules can overcome energy barrier, the  $E_a$  (activation energy) of the reaction is [ $\log 3.8 = 0.58$ ]  
 (A) 12 kJ/mole      (B) 831.4 kJ/mole      (C) 100 kJ/mole      (D) 88.57 kJ/mole
- Q.12 The minimum mass of mixture of  $A_2$  and  $B_4$  required to produce at least 1 kg of each product is :  
 (Given At. mass of 'A' = 10 ; At. mass of 'B' = 120)  
 $5A_2 + 2B_4 \longrightarrow 2AB_2 + 4A_2B$   
 (A) 2120 gm      (B) 1060 gm      (C) 560 gm      (D) 1660 gm
- Q.13 The mass of  $\text{CO}_2$  produced from 620 gm mixture of  $\text{C}_2\text{H}_4\text{O}_2$  &  $\text{O}_2$ , prepared to produce maximum energy is (Combustion reaction is exothermic)  
 (A) 413.33 gm      (B) 593.04 gm      (C) 440 gm      (D) 320 gm
- Q.14 Calculate percentage change in  $M_{\text{avg}}$  of the mixture, if  $\text{PCl}_5$  undergo 50% decomposition.  
 $\text{PCl}_5 \longrightarrow \text{PCl}_3 + \text{Cl}_2$   
 (A) 50%      (B) 66.66 %      (C) 33.33 %      (D) Zero
- Q.15 One mole mixture of  $\text{CH}_4$  & air (containing 80%  $\text{N}_2$  20%  $\text{O}_2$  by volume) of a composition such that when underwent combustion gave maximum heat (assume combustion of only  $\text{CH}_4$ ). Then which of the statements are correct, regarding composition of initial mixture. (X presents mole fraction)
- (A)  $X_{\text{CH}_4} = \frac{1}{11}, X_{\text{O}_2} = \frac{2}{11}, X_{\text{N}_2} = \frac{8}{11}$       (B)  $X_{\text{CH}_4} = \frac{3}{8}, X_{\text{O}_2} = \frac{1}{8}, X_{\text{N}_2} = \frac{1}{2}$   
 (C)  $X_{\text{CH}_4} = \frac{1}{6}, X_{\text{O}_2} = \frac{1}{6}, X_{\text{N}_2} = \frac{2}{3}$       (D) Data insufficient

Q.16 What volumes should you mix of 0.2 M NaCl and 0.1 M CaCl<sub>2</sub> solution so that in resulting solution the concentration of positive ion is 40% lesser than concentration of negative ion. Assuming total volume of solution 1000 ml.

- (A) 400 ml NaCl , 600 ml CaCl<sub>2</sub>                      (B) 600 ml NaCl, 400 ml CaCl<sub>2</sub>  
 (C) 800 ml NaCl, 200 ml CaCl<sub>2</sub>                      (D) None of these

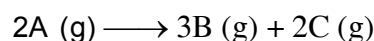
Q.17 If 50 gm oleum sample rated as 118% is mixed with 18 gm water, then the correct option is

- (A) The resulting solution contains 18 gm of water and 118 gm H<sub>2</sub>SO<sub>4</sub>  
 (B) The resulting solution contains 9 gm water and 59 gm H<sub>2</sub>SO<sub>4</sub>  
 (C) The resulting solution contains only 118 gm pure H<sub>2</sub>SO<sub>4</sub>  
 (D) The resulting solution contains 68 gm of pure H<sub>2</sub>SO<sub>4</sub>

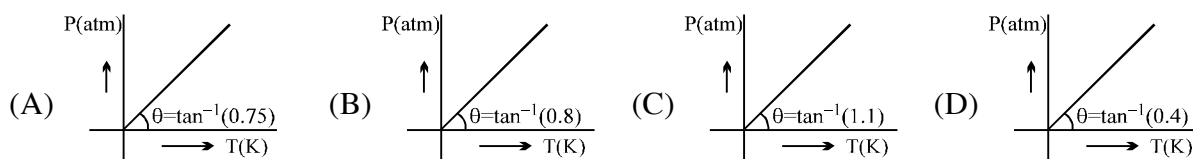
Q.18 The density of gas A is twice that of B at the same temperature the molecular weight of gas B is thrice that of A. The ratio of pressure of gas A and gas B will be

- (A) 1 : 6                      (B) 7 : 8                      (C) 6 : 1                      (D) 1 : 4

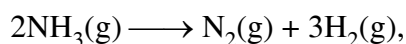
Q.19 Gas A (1 mol) dissociates in a closed rigid container of volume 0.16 lit. as per following reaction.



If degree of dissociation of A is 0.4 and remains constant in entire range of temperature, then the correct P vs T graph is [Given R = 0.08 lit-atm/mol/K]



Q.20 For the reaction



what is the % of NH<sub>3</sub> converted if the mixture diffuses twice as fast as that of SO<sub>2</sub> under similar conditions.

- (A) 3.125 %                      (B) 31.25 %                      (C) 6.25 %                      (D) 62.5 %

Q.21 Temperature at which most probable speed of O<sub>2</sub> becomes equal to root mean square speed of N<sub>2</sub> is [Given : N<sub>2</sub> at 427°C]

- (A) 732 K                      (B) 1200 K                      (C) 927 K                      (D) 800 K

Q.22 Human lungs can absorb 8 gm O<sub>2</sub> per hour by respiration. If all oxygen atoms are converted to carbohydrates (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) how long will it take to produce 180 gm C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>

- (A) 8 hour                      (B) 12 hour                      (C) 10 hour                      (D) 6 hour

Q.23 Label the oleum sample which contains 40% by mass of combined SO<sub>3</sub>

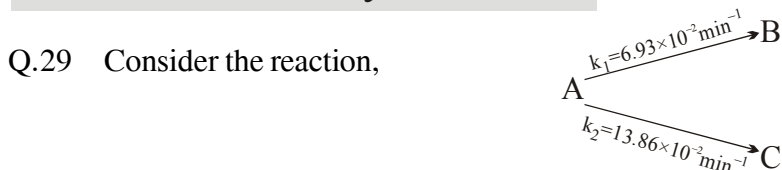
- (A) 108.45%                      (B) 109%                      (C) 111.47%                      (D) 113.33%

Q.24 If mole fraction of NaCl<sub>(aq)</sub> is same as that of water then molality of NaCl is

- (A) 5.55                      (B) 55.55                      (C) 0.18                      (D) 58.5

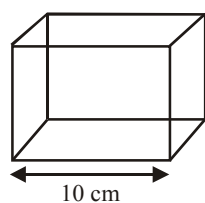
- Q.24 Three gases A, B and C are at same temperature. If their r.m.s. speed are in the ratio  $1 : \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}}$  then their molar masses will be in the ratio :  
 (A) 1 : 2 : 3                      (B) 3 : 2 : 1                      (C)  $1 : \sqrt{2} : \sqrt{3}$                       (D)  $\sqrt{3} : \sqrt{2} : 1$
- Q.26 A regular cube of metal measures exactly 10 cm on an edge and has density 8g/cc. If the cube contains  $6 \times 10^{25}$  atoms of the metal, determine atomic weight of metal ? (take  $N_A = 6 \times 10^{23}$ )  
 (A) 40                      (B) 60                      (C) 80                      (D) 100
- Q.27 An open vessel at  $27^\circ\text{C}$  is heated until  $\frac{3}{8}$ th of air in it has been expelled. Assuming that the volume remain constant, find the temperature at which the vessel was heated :  
 (A)  $307^\circ\text{C}$                       (B)  $107^\circ\text{C}$                       (C)  $480^\circ\text{C}$                       (D)  $207^\circ\text{C}$
- Q.28 300 gm, 30% (w/w) NaOH solution is mixed with 500 gm 40% (w/w) NaOH solution. What is % (w/v) NaOH if density of final solution is 2 gm/mL :  
 (A) 72.5                      (B) 65                      (C) 62.5                      (D) None of these

**One or more than may be correct ::**

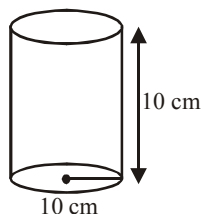


A, B and C all are optically active compound . If optical rotation per unit concentration of A, B and C are  $60^\circ, -72^\circ, 42^\circ$  and initial concentration of A is 2 M then select write statement(s).

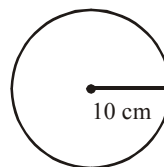
- (A) Solution will be optically active and dextro after very long time  
 (B) Solution will be optically active and levo after very long time  
 (C) Half life of reaction is 15 min  
 (D) After 75% conversion of A into B and C angle of rotation of solution will be  $36^\circ$ .
- Q.30 Three closed containers are filled with equal amount of same ideal gas.



Container-I  
(Cube)



Container-II  
(Cylinder)



Container-III  
(Sphere)

If pressure is same in all container then -

- (A)  $(U_{\text{rms}})_3 > (U_{\text{rms}})_2 > (U_{\text{rms}})_1$                       (B)  $(U_{\text{rms}})_3 = (U_{\text{rms}})_2 = (U_{\text{rms}})_1$   
 (C)  $\lambda_1 < \lambda_2 < \lambda_3$  ( $\lambda \rightarrow$  Mean free path)                      (D)  $(z_1)_1 < (z_1)_2 < (z_1)_3$

**Paragraph ::**
**Paragraph for Question Nos. 31 to 33**

The rate of decay of a radioactive element is independent of temperature and pressure, in fact of any external condition. A simple law giving the rate of radioactive disintegration was discovered by Rutherford. It states : A certain constant fraction of any sample of a radioactive element disintegrates in a unit time. This means that the number of atoms which disintegrate in a unit time is a constant fraction of the total number of atoms present.

This type of disintegration in radioactive elements follows first order rate equation, which can be expressed as :-

$$-\frac{dN}{dt} = \lambda N$$

Where,  $\lambda$  is decay constant or disintegration constant.

$$\text{So, } N = N_0 e^{-\lambda t}$$

Where,  $N$  = number of atoms at time  $t$  and  $N_0$  = number of atoms at  $t = 0$

Similarly, half life period can be written as :-

Q.31 If the amount of radioactive substance is increased three times, the number of atoms disintegrating per unit time would :-

(A) Double

(B) Not change

(C) Triple

(D) Become  $\frac{1}{3}$  of the original number of atoms

Q.32 age of old wood sample if activity of old wood and freshly cut tree are 7.6 and 15.2 disintegration  $\text{min}^{-1}\text{g}^{-1}$  of carbon ( $t_{1/2} = 5760$  years)

(A) 5760 years

(B)  $5760 \times \frac{15.2}{7.6}$  years

(C)  $5760 \times \frac{7.6}{15.2}$  years

(D)  $5760 \times (15.2 - 7.6)$  years

Q.33 If  $N^0$  is the initial number of nuclei, the number of nuclei remaining undecayed at the end of  $n$ th half life is :-

(A)  $2^{-n}N^0$

(B)  $2^n N^0$

(C)  $n^{-2}N^0$

(D)  $n^2 N^0$

**Paragraph for Q.34 to Q.36**

Order of a reaction is determined experimentally which may be positive, negative, zero or fractional.

For the given reaction :



Where  $k$  = Rate constant wrt reaction ;  $[A]_0 = 2 \text{ M}$  ;  $(\ln 2 = 0.7)$

Q.34 If rate constant was found to be  $k = 0.07 \text{ sec}^{-1}$ , then concentration of C at 10 second is.

(A) 0.5 M

(B) 1 M

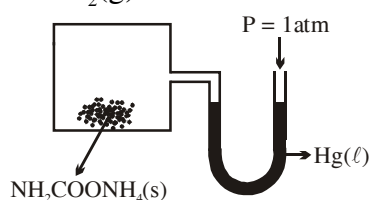
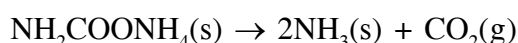
(C) 1.5 M

(D) 3 M

- Q.35 If the rate constant was found to be  $k = 0.07 \text{ mol L}^{-1} \text{ sec}^{-1}$  then find rate of formation of 'C' at 10 second in  $\text{mol L}^{-1} \text{ sec}^{-1}$   
 (A) 0.07 (B) 0.14 (C) 0.28 (D) 0.56
- Q.36 What is the ratio of total heat liberated in above reaction in 10 sec. in above questions given for the paragraph -  
 (A) 15 : 14 (B) 15 : 7 (C) 15 : 28 (D) 5 : 6

**Paragraph for Q. 37 to Q. 39**

A manometer attached to 36 litre flask contains some inert gas & ammonium carbamate  $[\text{NH}_2\text{COONH}_4(\text{s})]$  having no difference in mercury level initially as shown.  $\text{NH}_2\text{COONH}_4(\text{s})$  decomposed completely on heating according to reaction

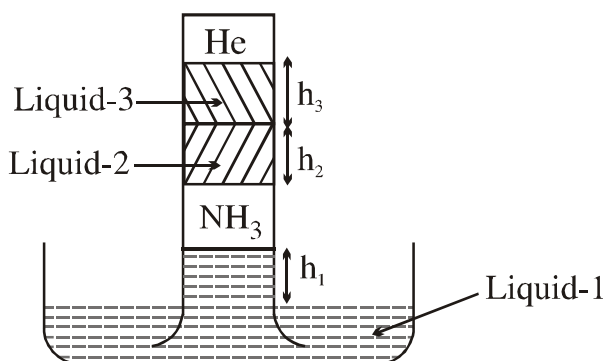


If same amount of  $\text{NH}_2\text{COONH}_4(\text{s})$  is decomposed completely in separate container and produced  $\text{NH}_3(\text{g})$ , which required 500 ml of 2N  $\text{H}_3\text{PO}_4$  solution for complete neutralisation. During the process temperature remains at 300K.  $[R = 0.08 \text{ atm-litre mole}^{-1}\text{K}^{-1}]$

- Q.37 The difference in height of Hg column (in mm) after complete decomposition of  $\text{NH}_2\text{COONH}_4(\text{s})$  is:  
 (A) 380 (B) 760 (C) 540 (D) None of these
- Q.38 Number of moles of  $\text{CO}_2(\text{g})$  produced is  
 (A) 2 (B) 0.5 (C) 4 (D) 1
- Q.39 Number of moles of inert gas present in the container-  
 (A) 1 (B) 2 (C) 0.5 (D) 1.5

**Paragraph for Q.40 to Q.42**

In barometer system different liquids are placed along with trapped gases of  $\text{NH}_3$  and He as shown in diagram. Use given data to answer following questions assuming temperature to remain constant at 300K. (Atmospheric pressure = 1 atm)



For liquid-1

$$d_1 = 27.2 \text{ g/cc}$$

$$h_1 = 19 \text{ cm}$$

For liquid-2

$$d_2 = 13.6 \text{ g/cc}$$

$$h_2 = 15.2 \text{ cm}$$

For liquid-3

$$d_3 = 6.8 \text{ g/cc}$$

$$h_3 = 15.2 \text{ cm}$$

Q.40 Pressure exerted by He gas will be

- (A) 0.4 atm                      (B) 0.5 atm                      (C) 0.75 atm                      (D) 0.2 atm

 Q.41 Pressure exerted by  $\text{NH}_3$  gas will be

- (A) 0.4 atm                      (B) 0.5 atm                      (C) 0.75 atm                      (D) 0.2 atm

 Q.42 If  $\text{NH}_3$  gas dissociates completely into constituent gases due to which pressure of He gas becomes 0.7 atm. Calculate new height '  $h_1$  '.

- (A) 0 cm                      (B) 8.5 cm                      (C) 19 cm                      (D) 3.8 cm

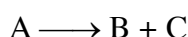
**Subjective ::**

 Q.43 Three ideal gases  $\text{H}_2$ ,  $\text{CH}_4$  and  $\text{SO}_2$  are filled in three rigid containers A, B and C respectively.

$W_{\text{H}_2} = 64 \text{ gm}$ $V = 2 \text{ L}$ $T = 200 \text{ K}$	$W_{\text{CH}_4} = 64 \text{ gm}$ $V = 1 \text{ L}$ $T = 400 \text{ K}$	$W_{\text{SO}_2} = 128 \text{ gm}$ $V = 2 \text{ L}$ $T = 1600 \text{ K}$
A	B	C

the ratio of most probable speeds of molecules in all containers is  $x : y : z$  then calculate the value of  $\left(\frac{x+y}{z}\right)$ .

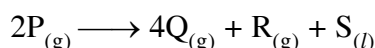
Q.44 For the first order



<b>Time</b>	$t$	$\infty$
<b>Total pressure of A + B+C</b>	$P_2$	$P_3$

Find rate constant (k)

Q.45 The decomposition of a compound P, at temperature T according to the equation



is the first order reaction. After 30 minutes from the start of decomposition in a closed vessel, the total pressure developed is found to be 317 mm Hg and after a long period of time the total pressure observed to be 617 mm Hg. Calculate the total pressure of the vessel after 75 minutes, if volume of liquid S is supposed to be negligible. Also calculate the time fraction  $t_{7/8}$ .

**Given :** Vapour pressure of S (l) at temperature T = 32.5 mm Hg.

- Q.46 At room temperature (20°C) orange juice gets spoilt in about 64 hours. In a refrigerator at 3°C juice can be stored three times as long before it gets spoilt. Estimate (a) the activation energy of the reaction that causes the spoiling of juice. (b) How long should it take for juice to get spoilt at 40°C?
- Q.47 At any given time a piece of radioactive material ( $t_{1/2} = 30$  days) contains  $10^{12}$  atoms. Calculate the activity of the sample in dps.
- Q.48 A sample of  $U^{238}$  (half life =  $4.5 \times 10^9$  yr) ore is found to contain 23.8 g of  $U^{238}$  and 20.6 g of  $Pb^{206}$ . Calculate the age of the ore.
- Q.49 The nuclei of two radioactive isotopes of same substance  $X^{236}$  and  $X^{234}$  are present in the ratio of 4 : 1 in an ore obtained from the source. Their  $t_{1/2}$  are 30 min and 60 min respectively. Both isotopes are  $\alpha$ -emitters and activity of isotopes with  $t_{1/2} = 30$  in is  $10^6$  dps. Calculate after how much time (in hour) their activity will become identical
- Q.50 A reaction :  $A_2(g) \longrightarrow B(g) + \frac{1}{2} C(g)$ , exhibits an increase in pressure from 150 mm to 170 mm in 10 minutes. The rate of disappearance of  $A_2$  in mm per minutes is .....

### ANSKEY-PHYSICAL CHEMISTRY

- |   |               |   |          |
|---|---------------|---|----------|
| Q.1 (D)   | Q.2 (B)       | Q.3 (D)   | Q.4 (D)  |
| Q.5 (B)   | Q.6 (C)       | Q.7 (C)   | Q.8 (C)  |
| Q.9 (C)   | Q.10 (A)      | Q.11 (C)  | Q.12 (A) |
| Q.13 (C)  | Q.14 (C)      | Q.15 (A)  | Q.16 (D) |
| Q.17 (B)  | Q.18 (C)      | Q.19 (B)  | Q.20 (C) |
| Q.21 (B)  | Q.22 (B)      | Q.23 (C)  | Q.24 (B) |
| Q.25 (A)  | Q.26 (C)      | Q.27 (D)  | Q.28 (A) |
| Q.29 (A), (D)   | Q.30 (A), (C) | Q.31 (C)  | Q.32 (A) |
| Q.33 (A)  | Q.34 (D)      | Q.35 (B)  | Q.36 (C) |
| Q.37 (B)  | Q.38 (B)      | Q.39 (D)  |          |
| Q.40 (D)  | Q.41 (B)      | Q.42 (A)  |          |
| Q.44 $k = \frac{1}{t} \ln \frac{P_3}{2(P_3 - P_2)}$   |               | Q.45 $P_t = 379.55$ mm Hg, $t^{7/8} = 399.96$ min |          |
| Q.46 (a) $43.46$ kJmol <sup>-1</sup> , (b) 20.47 hour |               | Q.47 $2.67 \times 10^5$ dps                       |          |
| Q.48 $4.5 \times 10^9$ year                           |               | Q.49 3  |          |
| Q.50 4  |               |   |          |

# INORGANIC CHEMISTRY

## Chemical bonding, Periodic table

**Only one correct ::**

- Q.1 Molecule having highest number of S–O–S linkage is -  
 (A)  $S_3O_9$  (B)  $H_2S_4O_6$  (C)  $Na_2S_3O_6$  (D)  $H_2S_2O_5$
- Q.2 Find the maximum number of angle, which are less than  $90^\circ$  in  $IF_5$ .  
 (A) 0 (B) 4 (C) 8 (D) 12
- Q.3 In  $ClO_2$  unpaired  $e^-$  reside in :-  
 (A)  $sp^2$  hybridised orbital (B)  $sp^3$  hybridised orbital  
 (C) p orbital (D) d orbital
- Q.4 Which of the following molecule is diamagnetic.  
 (A) NO (B)  $NO_2$  (C)  $O_2$  (D)  $N_2$
- Q.5 Which of the following ionization energy order is incorrect :-  
 (A)  $O_2 < O$  (B)  $N_2 > N$  (C)  $O < N$  (D)  $F_2 > F$
- Q.6 Find the maximum number of plane having maximum number of same atoms in  $POCl_3$ .  
 (A) 1 (B) 2 (C) 3 (D) 4
- Q.7 Which of the following molecule/ion does not exist.  
 (A)  $PCl_6^-$  (B)  $ICl_3$  (C)  $BF_4^-$  (D)  $XeF_3^-$
- Q.8 Which of the following molecule having least bond angle.  
 (A)  $H_2Se$  (B)  $H_2S$  (C)  $NF_3$  (D)  $PH_3$
- Q.9 Which of the following molecule having highest thermal stability.  
 (A)  $HClO$  (B)  $HClO_2$  (C)  $HClO_3$  (D)  $HClO_4$
- Q.10 The number of water molecule directly co-ordinated to the metal atom in blue vitrol is-  
 (A) 0 (B) 1 (C) 5 (D) 4
- Q.11 Which of the following statement is incorrect regarding to the bonding of ice.  
 (A) Intermolecular hydrogen bonding is present  
 (B) In ice each oxygen form two hydrogen and two covalent bond  
 (C) Ice consist of tetrahedral units.  
 (D) At  $4^\circ C$  density is minimum.
- Q.12 Which of the following molecule exhibit intermolecular hydrogen bonding  
 (A) o-nitrophenol (B) o-chlorophenol (C) Catechol (D) o-boric acid
- Q.13 Identify the correct order of boiling point :-  
 (A)  $HF < HCl < HBr < HI$  (B)  $NH_3 < PH_3 < AsH_3 < SbH_3$   
 (C)  $CH_4 < SiH_4 < GeH_4 < SnH_4$  (D) All are correct

- Q.14 In which of the following process the magnetic behaviour of molecule gets change.  
 (A)  $O_2 \longrightarrow O_2^-$  (B)  $O_2^+ \longrightarrow O_2^-$  (C)  $O_2^{2+} \longrightarrow O_2^{2-}$  (D)  $O_2 \longrightarrow O_2^{2-}$
- Q.15 Incorrect order of bond length is .  
 (A)  $CO < CO^+$  (B)  $NO > NO^+$  (C)  $N_2^+ < N_2^-$  (D)  $H_2^+ < H_2^-$
- Q.16 Which of the following value is not possible for the bond order of molecule :-  
 (A) Zero (B) Negative (C) Fraction (D) None of these
- Q.17 Define the relation among the EN, IE and E.A.  
 (A)  $EN = \frac{IE \times EA}{2}$  (B)  $2EN = IE + EA$  (C)  $2EN = IE - EA$  (D)  $EN = \frac{IE - EA}{2}$
- Q.18 Lanthanoid contraction is not applicable on group of following element set.  
 (A) Zn, Cd, Hg (B) Ti, Zr, Hf (C) Sc, Y, La (D) Cu, Ag, Au
- Q.19 Define the atomic number of element which is present just below the 'Ru'.  
 (A) 76 (B) 44 (C) 74 (D) 77
- Q.20 Define the number of electron in 'd' sub-shell of valence shell of 'W' element.  
 (A) 2 (B) 3 (C) 4 (D) 5
- Q.21 Define the correct order of Ist Ionization energy.  
 (A)  $N < O$  (B)  $H > He$  (C)  $Bi > Sb$  (D)  $Pb > Sn$
- Q.22 Define the correct order of atomic radius.  
 (A)  $Na > Mg > Li > Be$  (B)  $Na > Li > Mg > Be$   
 (C)  $K > Rb > Ca > Sr$  (D)  $Rb > K > Sr > Ca$
- Q.23 Which is the metal not known as noble metal.  
 (A) Ag (B) Au (C) Cu (D) Pt
- Q.24 Total no. of electron in Na having  $n \times \ell = 0$  is -  
 (A) 5 (B) 2 (C) 6 (D) 8
- Q.25 Find the maximum no. of  $e^-$  in the d-orbital of outer most shell of Zn .  
 (A) 10 (B) 0 (C) 2 (D) 6
- Q.26 Group of element which does not show digonal relationship.  
 (A) Li, Mg (B) Be, Al (C) B, Si (D) C, P

**One or more than may be correct ::**

- Q.27 Which of the following statement is/are correct :-  
 (A)  $HgCl_2$  is more covalent than  $ZnCl_2$   
 (B)  $K_{sp}$  of  $AgF$  is greater than  $AgCl$   
 (C) Thermal stability of  $BaO_2$  is greater than  $BeO_2$   
 (D) Intensity of colour of ionic compound increases with increase in polarisation of anion
- Q.28 Which of the following statement(s) is/are incorrect :-  
 (A)  $AlF_3$  is predominately covalent in nature (B)  $NOF_3$  does not exist  
 (C)  $(SCN)_2$  is pseudohalogen (D)  $BF_4^-$  has back bonding
- Q.29 Which of the following molecule(s) is/are exist.  
 (A)  $PbI_4$  (B)  $FeI_2$  (C)  $Hg_2I_2$  (D)  $PbCl_4$

- Q.30 Which of the following molecule(s) is/are planar as well as polar.  
 (A)  $\text{SnCl}_2$  (B)  $\text{BF}_3$  (C)  $\text{HCl}$  (D)  $\text{NH}_3$
- Q.31 Which of the following overlapping results non-bonding molecular orbitals, if z-axis is considered as internuclear axis.  
 (A)  $p_z + p_z$  (B)  $p_y + p_y$  (C)  $p_x + s$  (D)  $p_y + s$
- Q.32 When  $\text{BCl}_3$  reacts with excess of  $\text{H}_2\text{O}$  in the presence of  $\text{NaOH}$ . Then the formed product(s) is/are.  
 (A)  $\text{Na}[\text{B}(\text{OH})_4]$  (B)  $\text{NaCl}$  (C)  $\text{HOCl}$  (D)  $\text{HCl}$
- Q.33 Which of the following order of solubility in water is/are correct :-  
 (A)  $\text{BeC}_2\text{O}_4 > \text{BaC}_2\text{O}_4$  (B)  $\text{NaHCO}_3 > \text{KHCO}_3$   
 (C)  $\text{NaCl} > \text{KCl}$  (D)  $\text{BeF}_2 > \text{BaF}_2$
- Q.34 Which of the following having maximum number of unpaired electron -  
 (A)  $\text{Na}^+$  (B)  $\text{N}^{3-}$  (C)  $\text{Fe}^{3+}$  (D)  $\text{Cr}^+$
- Q.35 The correct order of density is/are :-  
 (A)  $\text{Sc} < \text{Y} < \text{La}$  (B)  $\text{Mg} < \text{Ca} < \text{Ba} < \text{Sr}$  (C)  $\text{Ti} < \text{Zr} < \text{Hf}$  (D)  $\text{Zn} < \text{Cd} < \text{Hg}$
- Q.36 Which of the following order is/are incorrect.  
 (A)  $\text{Na} > \text{K} \longrightarrow$  order of volume  
 (B)  $\text{Na}_{\text{aq}}^+ < \text{K}_{\text{aq}}^+ < \text{Rb}_{\text{aq}}^+ < \text{Cs}_{\text{aq}}^+ < \text{Li}_{\text{aq}}^+$  order of Hydration energy  
 (C)  $\text{He} > \text{Ne} > \text{Ar} > \text{Kr} > \text{Xe}$  Vander waal radius.  
 (D)  $\text{Be} < \text{Mg} = \text{Ca} = \text{Sr} = \text{Ba}$  order of  $Z_{\text{eff}}$
- Q.37 Which of the following order is/are correct.  
 (A)  $\text{NO} > \text{N}_2\text{O}$  Acidic strength order (B)  $\text{SO}_3 > \text{SO}_2$  Acidic strength order  
 (C)  $\text{NH}_3 < \text{PH}_3$  Basic strength order (D)  $\text{HClO} < \text{HClO}_2 < \text{HClO}_3$  Acidic strength order
- Q.38 Which of the following is/are correct.  
 (A)  $\text{N}_2\text{O}$  is anhydric form of  $\text{H}_2\text{N}_2\text{O}_2$   
 (B) Ionisation energy for  $\text{Cl}^-$  is greater than  $\text{F}^-$   
 (C)  $\text{AgI}$  have less ionic character than the  $\text{AgBr}$   
 (D)  $\text{ClBr}$  know as chlorine bromide
- Q.39 Which in the following process is/are exothermic :-  
 (A)  $\text{Na}^+ + \text{e}^- \longrightarrow \text{Na}$  (B)  $\text{N} + \text{e}^- \longrightarrow \text{N}^-$  (C)  $\text{O}^- + \text{e}^- \longrightarrow \text{O}^{2-}$  (D)  $\text{Li} + \text{e}^- \longrightarrow \text{Li}^-$
- Q.40 Which of the following order is/are correct :-  
 (A) Order of E.A.  $\longrightarrow \text{Be} < \text{B}$   
 (B) Order of E.N.  $\longrightarrow \text{Fe} < \text{Fe}^{2+} < \text{Fe}^{3+}$   
 (C) Order of Reducing property strength  $\Rightarrow \text{Na} < \text{K} < \text{Rb} < \text{Cs} < \text{Li}$   
 (D) Order of melting point  $\Rightarrow \text{Zn} < \text{Cd} < \text{Hg}$
- Q.41. Identify the incorrect order(s)-  
 (A)  $ns < np < nd < nf$  (penetration power)  
 (B)  $\text{Li} < \text{Na} < \text{K} < \text{Cs}$  (reducing power)  
 (C)  $\text{K}^+ < \text{Na}^+ < \text{Li}^+$  (hydration energy)  
 (D)  $\text{MgO} < \text{Mg}_3\text{N}_2 < \text{TiC}$  (lattice energy, considering the inter-ionic distance is same)

**Paragraph ::****Paragraph for Q.42 to Q.43**

Quantum number described an  $e^-$  in an atom. If Quantum number are described as follows -

- (a) Principal quantum number.  $\Rightarrow$  denoted by (n)  $\rightarrow$  where  $n = 1, 2, 3$   
 (b) Azimuthal quantum number.  $\Rightarrow$  denoted by ( $\ell$ )  $\rightarrow$  where  $\ell = 0$  to  $n + 1$   
 (c) Magnetic quantum number  $\Rightarrow$  denoted by (m)  $\rightarrow$  where  $m \Rightarrow -\ell$  to  $+\ell$   
 (d) Spin quantum number  $\Rightarrow$  denoted by (s)  $\rightarrow$  where  $s \Rightarrow \pm 1/2$

- Q.42 By using the above informations define the electronic configuration of 'S' atom  
 (A)  $1s^2, 2s^2 2p^6, 3s^2 3p^4$  (B)  $1s^2 1p^6 d^6 2s^2$   
 (C)  $1s^2 1p^6 1d^{10}$  (D)  $1s^2 1p^6 2p^6 2d^2$
- Q.43 Define the maximum number of electron can be accommodated in an orbital of s, p, d, f subshell.  
 (A) 2, 6, 10, 14 (B) 2, 2, 2, 2 (C) 1, 3, 5, 7 (D) 2, 8, 18, 32

**Paragraph for Q.No. 44 to 46**

Tendency of one atom to attract the electron of a bond pair towards itself is known as electronegativity. Orbital which contain more % of S character, the associated atom with that orbital has more electron negativity.

- Q.44 Define the order of  $d_{C-H}$  bond length.  
 I  $\rightarrow$   $C_2H_2$       II  $\rightarrow$   $C_2H_4$       III  $\rightarrow$   $C_2H_6$   
 (A)  $I < II < III$  (B)  $I > III > II$  (C)  $III > I > II$  (D)  $I > II > III$
- Q.45 Which of the following statement is correct.  
 (A) Bond order increases when % of p character in hybrid orbital of C increases  
 (B) In above examples order of  $d_{C-C}$  bond length  $I > II > III$ .  
 (C) When E.N increases reactivity increases  
 (D) When difference of EN increases, % of ionic character in a bond increases.
- Q.46 % of Ionic character may be calculated by following method when 'A' is more electronegative than 'B'  
 (A) % I.C. =  $16(X_A + X_B) + 3.5(X_A - X_B)$  (B) % I.C. =  $16(X_A - X_B) + 3.5(X_A - X_B)^2$   
 (C) % I.C. =  $16(X_A + X_B)^2 + 3.5(X_A + X_B)$  (D) % I.C. =  $16(X_A - X_B)^2 + 3.5(X_A - X_B)$

**Match the column ::**

- Q.47
- Match the column**

**Column-I (A)**

- (A) X $eF_4$   
 (B) S $F_4$   
 (C) Cl $O_3$   
 (D) N $O_2$

**Column-II (B)**

- (P) Underlined atom is  $sp^3$  hybridised  
 (Q)  $dz^2$  orbital is involved in the hybridisation of their central atom  
 (R) Maximum number of atoms in one plane is three  
 (S) Molecule is planar  
 (T) Unpaired electron resides in  $sp^2$  hybridised orbital



- Q.57 Find the moles of oxyacid formed when 241 gm of  $\text{NCl}_3$  hydrolysed with 54 gm of  $\text{H}_2\text{O}$  (At.wt. of N = 14, Cl = 35.5)
- Q.58 In modern periodic table number of element in 3<sup>rd</sup> period
- Q.59 Number of compounds which are acidic in nature.  
 $\text{N}_2\text{O}$ ,  $\text{NO}_2$ ,  $\text{P}_2\text{O}_5$ ,  $\text{CaO}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{SO}_3$ ,  $\text{CO}$ ,  $\text{Cl}_2\text{O}_7$ ,  $\text{SiO}_2$ ,  $\text{PbO}_2$
- Q.60 Define the difference of value of  $Z^*$  in between electron of 3d and 4s orbital of Sc.
- Q.61 Number of electron in valence shell of Cr is \_\_\_\_\_.
- Q.62 Define the group number of Co is the long form periodic table.

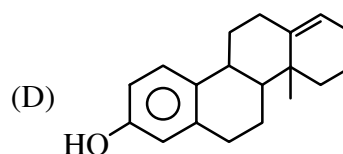
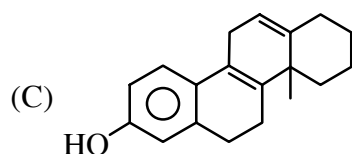
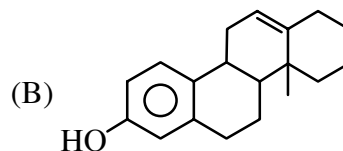
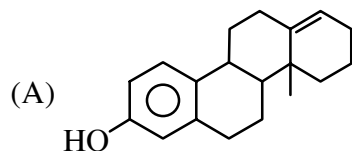
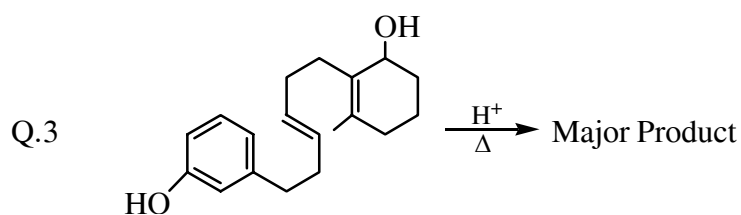
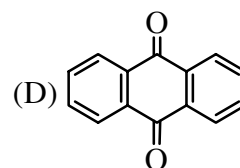
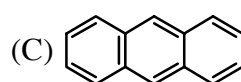
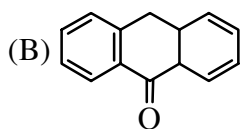
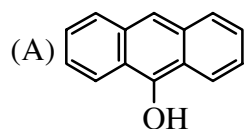
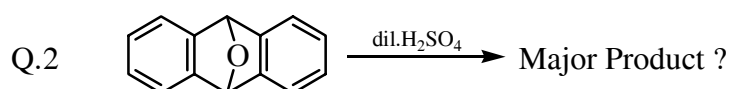
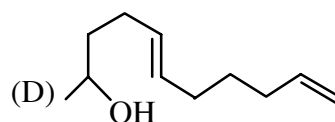
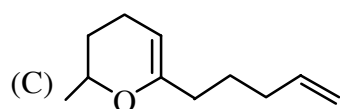
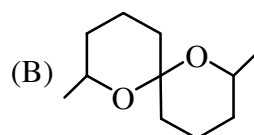
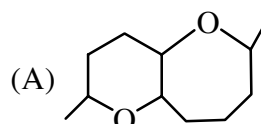
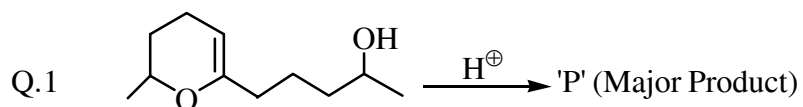
### ANSKEY-INORGANIC CHEMISTRY

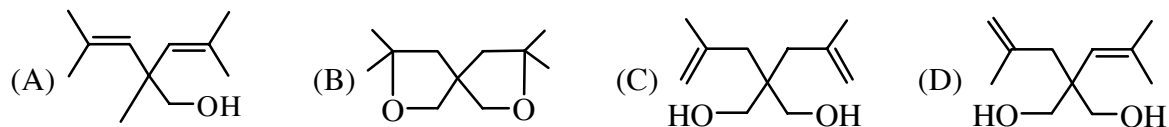
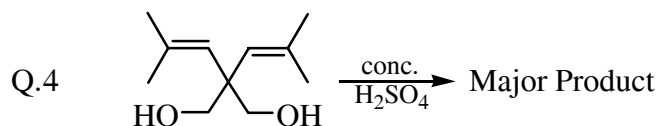
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|--|---|------------|--------------|
| Q.1 (A)  | Q.2 (C)                                       | Q.3 (D)    | Q.4 (D)      |
| Q.5 (D)  | Q.6 (A)                                       | Q.7 (D)    | Q.8 (A)      |
| Q.9 (D)  | Q.10 (D)                                      | Q.11 (D)   | Q.12 (D)     |
| Q.13 (C)   | Q.14 (D)                                      | Q.15 (A)   | Q.16 (D)     |
| Q.17 (B)   | Q.18 (C)                                      | Q.19 (A)   | Q.20 (C)     |
| Q.21 (D)   | Q.22 (A)                                      | Q.23 (C)   | Q.24 (A)     |
| Q.24 (A)   | Q.25 (C)                                      | Q.26 (D)   | Q.27 (A)     |
| Q.28 (A,B,C)                                     | Q.29 (A,B,C)                                  | Q.30 (A,C) | Q.31 (C)     |
| Q.32 (A,B)                                       | Q.33 (A,C,D)                                  | Q.34 (C,D) | Q.35 (A,C,D) |
| Q.36 (A,B,C)                                     | Q.37 (A,B,D)                                  | Q.38 (B,C) | Q.39 (A,D)   |
| Q.40 (A,B,C)                                     | Q.41 (A,B)                                    | Q.42 (B)   | Q.43 (B)     |
| Q.44 (A)   | Q.45 (D)                                      | Q.46 (B)   |              |
| Q.47 (A)-Q,S; (B)-Q, R; (C)-P, R; (D)-R, S, T    | Q.48 (A)- R,P,T ;(B)-T;(C) -R, T ;(D)-Q,R,S,T |            |              |
| Q.49 (A) - R ; (B) - S, Q ; (C) - P, Q ; (D) - T | Q.50 (A) - Q ; (B) - P ; (C) - S ; (D) - R    |            |              |
| Q.51 (4)   | Q.52 (2)                                      | Q.53 (4)   | Q.54 (2)     |
| Q.55 (2)   | Q.56 (3)                                      | Q.57 (3)   | Q.58 (8)     |
| Q.59 (5)   | Q.60 (0)                                      | Q.61 (6)   | Q.62 (9)     |

## ORGANIC CHEMISTRY

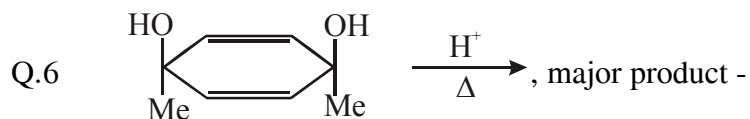
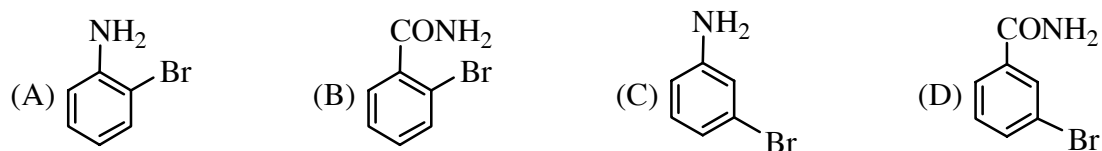
### GOC, IUPAC, Carbocation

Only one correct ::

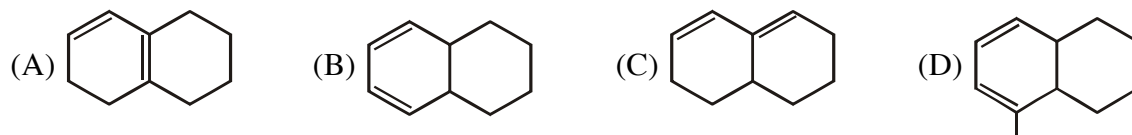




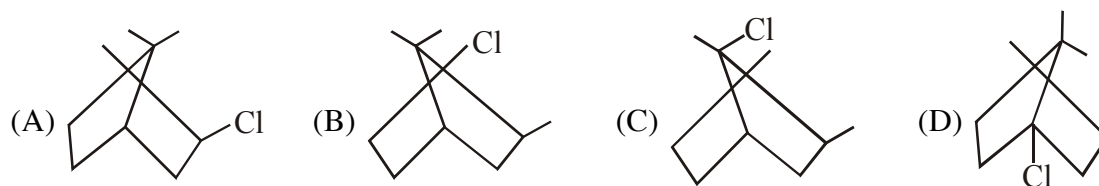
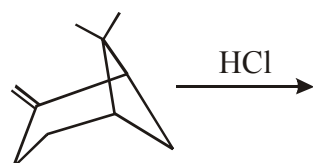
Q.5 meta-bromobenzamide :



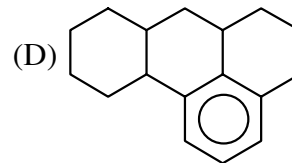
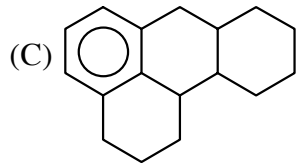
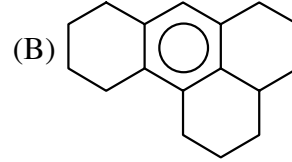
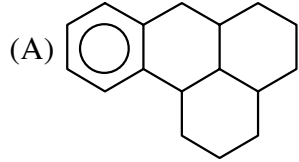
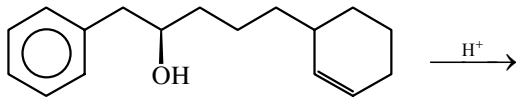
Q.7 Which compound give same kinetically & thermodynamically controlled product



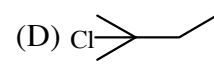
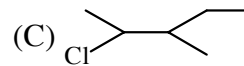
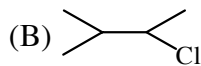
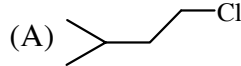
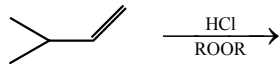
Q.8 Major product of the reaction



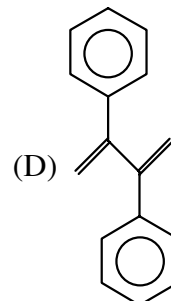
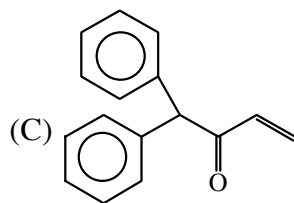
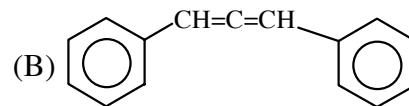
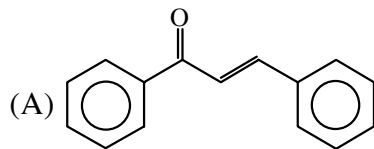
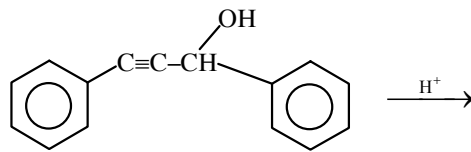
Q.9 Product obtained during reaction



Q.10 Major product of the reaction -



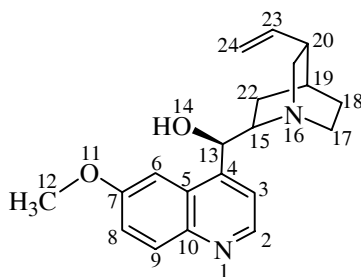
Q.11



**One or more than may be correct ::**

- Q.12 If p-nitrophenol can evolve  $\text{CO}_2$  with  $\text{NaHCO}_3$  then it may also react with -  
 (A)  $\text{NaOH}$  (B)  $\text{NaNH}_2$  (C)  $\text{NaCO}_2$  (D)  $\text{Na}$

**Paragraph ::**
**Paragraph for question Q.13 to Q.18**

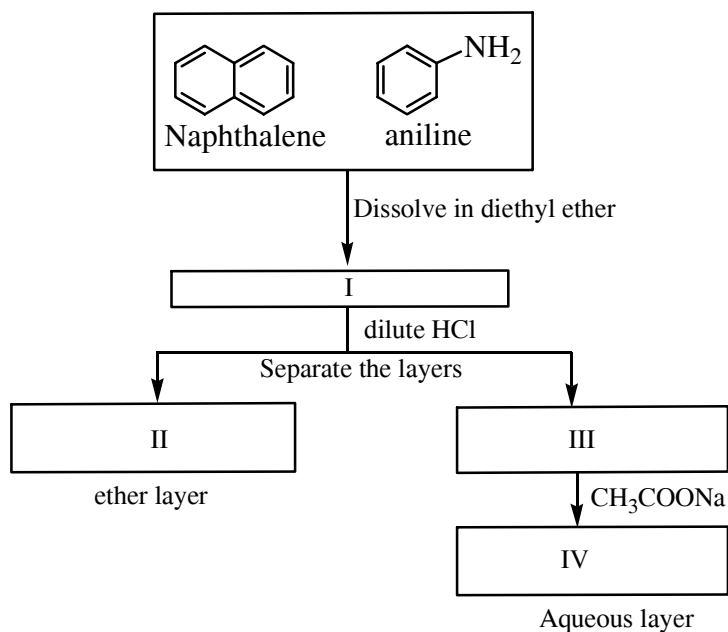
 For given compound **QUININE**


In some cases more than one answer may be correct and for full marks all correct answers must be selected

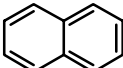
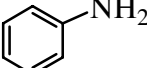
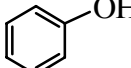
- Q.13 What is the oxidation state of C13 ?  
 (A) +2 (B) +1 (C) 0 (D) -1
- Q.14 Of the following list, which atom(s) is (are)  $\text{sp}^2$  hybridised ?  
 (A) N1 (B) C5 (C) O14 (D) N16
- Q.15 Which of the following carbon atoms are tertiary ?  
 (A) C2 (B) C12 (C) C19 (D) C20
- Q.16 Which carbon atom(s) is (are) ortho to a methoxy group ?  
 (A) C5 (B) C6 (C) C7 (D) C8
- Q.17 Which of the following functional groups are present in QUININE ?  
 (A) Alcohol (B) Amide (C) Ester (D) Ether
- Q.18 How many units of unsaturation are there in QUININE ?  
 (unit of unsaturation is the same as the index of hydrogen deficiency or IHD)  
 (A) 7 (B) 9 (C) 10 (D) 12

Paragraph for Question 19 to 22

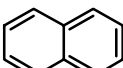
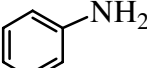
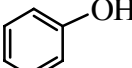
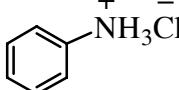
Acid base extraction scheme is shown for mixture containing organic compounds.



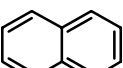
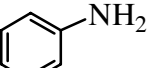
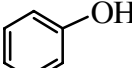
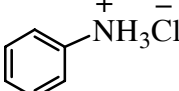
Q.19 Which of the species will be present in box I

- (A)  (B)  (C) both (A) and (B) (D) 

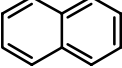
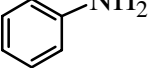
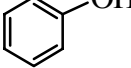
Q.20 Which of the species will be present in box II

- (A)  (B)  (C)  (D) 

Q.21 Which of the species will be present in box III

- (A)  (B)  (C)  (D) 

Q.22 Which of the species will be present in box IV

- (A)  (B)  (C)  (D) none

**Integer ::**

- Q.23 Possible no. of hydroxy cyclohexanone which on heating in acidic condition long time give cyclohex-2-enone as a major product.

**ANSKEY-ORGANIC CHEMISTRY**

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Q.1 (B)	Q.2 (A)	Q.3 (A)	Q.4 (B)
Q.5 (D)	Q.6 (D)	Q.7 (D)	Q.8 (A)
Q.9 (A)	Q.10 (D)	Q.11 (A)	Q.12 (A,B,C,D)
Q.13 (C)	Q.14 (A,B)	Q.15 (C)	Q.16 (B,D)
Q.17 (A,D)	Q.18 (C)	Q.19 (C)	Q.20 (A)
Q.21 (D)	Q.22 (B)	Q.23 (5)	