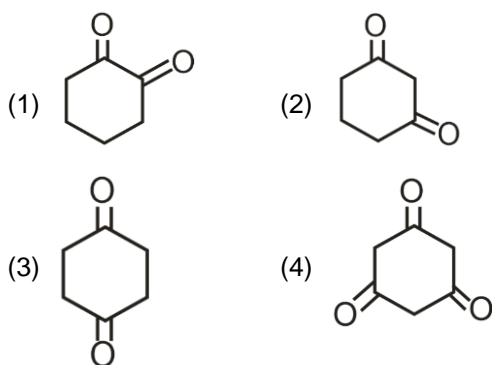# Chemistry JEE Solutions 2022
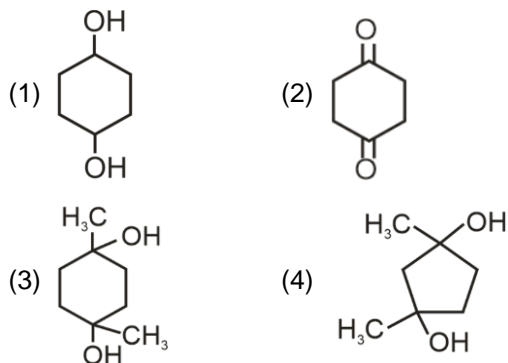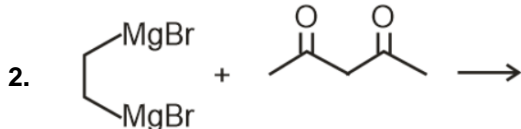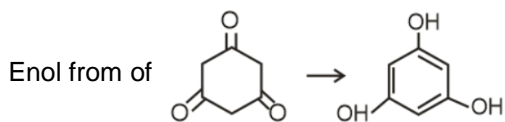
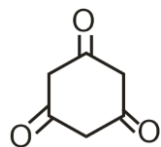## Chemistry

**1.** Most stable enol form will be shown by which of the following

(1) 

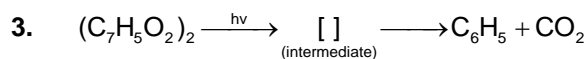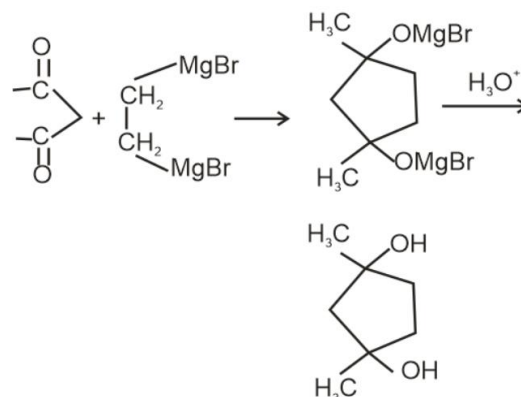(2) 

(3) 
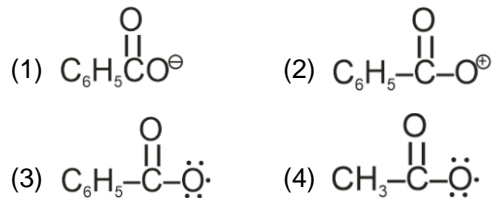
(4) 

**Sol.** Answer (4)

Most stable enol from will be shown by



Enol from of 

**2.** 

(1) 

(2) 

(3) 

(4) 

**Sol.** Answer (4)



**3.** $(C_7H_5O_2)_2 \xrightarrow{hv} \underset{\text{(intermediate)}}{[\ ]} \longrightarrow C_6H_5 + CO_2$

The intermediate is

(1) $C_6H_5\overset{O}{\underset{\|}{C}}O^\ominus$

(2) $C_6H_5-\overset{O}{\underset{\|}{C}}-O^\oplus$

(3) $C_6H_5-\overset{O}{\underset{\|}{C}}-\ddot{\underset{..}{O}}\cdot$

(4) $CH_3-\overset{O}{\underset{\|}{C}}-\ddot{\underset{..}{O}}\cdot$
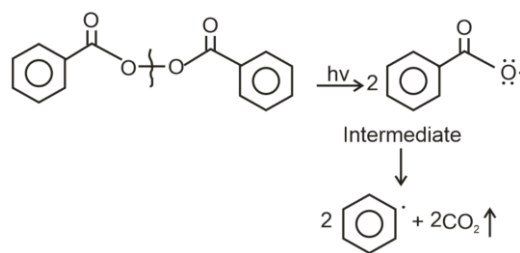
**Sol.** Answer (3)



**4.** The correct order of melting point of group 16 element is (oxygen family)

(1) O > S > Se > Te

(2) Te > Se > S > O
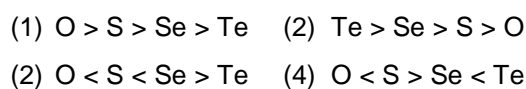
(2) O < S < Se > Te

(4) O < S > Se < Te

**Sol.** Answer (2)

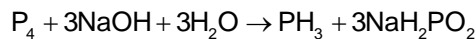Melting point of O, S, Se and Te and 55k, 393K, 490K and 725K respectively.

Hence correct order of melting point follows the order O < S < Se < Te

**5.** (White) P + Alkali metal oxide/Hydroxide $\rightarrow$ Product

The product is,

(1) White P      (2) Red P

(3) $H_3PO_3$      (4) $H_2PO_2^-$

**Sol.** Answer (4)

$$P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$$
(White phosphorus)

**6.** Which of the following is responsible for secretion of pepsin?

(1) Histamine      (2) Anti-histamine

(3) Cimetidine      (4) Zantac

**Sol.** Answer (1)

Histamine stimulates the secretion of pepsin and hydrochloric acid in stomach.

**7.** Which of the following set of match is correct

I.   Copolymer-Buna-N

II.   Condensation polymer-Nylon-6,6

III.   Fibre-Nylon-6.6

IV.   Thermosetting polymer – Terylene

(1) I, II, III      (2) II, III, IV

(3) I, II, IV      (4) I, III, V

**Sol.** Answer (1)

1. BUNA-N is copolymer of 1,3-butadiene & acryl nitrile

2. Nylon-6,6 is condensation of polymer of Hexamethylenediamine and adipic acid

3. Because of strong inter molecular H-bonding nylon-6,6 is the example of fibre.

4. Terylene is also example of fibre

**8.** **Statement I** : In Lassaigne's test of organic compound including both N and S, sodium thiocyanate is formed.
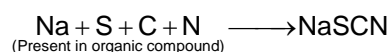
**Statement II :** Excess Na + NaSCN $\rightarrow$Na₂S+ NaCN

The correct statements are

(1) Both (1) and (2)      (2) Only 1

(3) Only 2      (4) None

**Sol.** Answer (1)

First statement is correct

$$\underset{\text{(Present in organic compound)}}{Na + S + C + N} \longrightarrow NaSCN$$

Second statement is also correct.

**9.** The correct order of melting point of group 16 hydrides is

(1) $H_2O > H_2S > H_2Se > HeT_e$

(2) $H_2O > H_2Te > H_2Se > H_2S$

(3) $H_2Te > H_2Se > H_2O > H_2S$

(4) $H_2S > H_2Te > H_2O > H_2Se$
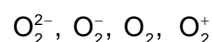
**Sol.** Answer (2)

Hydride – M.P.

$H_2O$ – 273 K

$H_2S$ – 188 K

$H_2Se$ – 208 K

$H_2Te$ – 222 K

**10.** The correct decreasing order of the bond order of the following species,

$$O_2^{2-}, \; O_2^-, \; O_2, \; O_2^+$$

(1) $O_2^- > O_2^{2-} > O_2 > O_2^+$

(2) $O_2^{2-} > O_2 > O_2^+ > O_2^-$

(3) $O_2^- > O_2 > O_2^+ > O_2^{2-}$

(4) $O_2^+ > O_2 > O_2^- > O_2^{2-}$

**Sol.** Answer (4)

Species bond order

$$O_2^+ = 2.5$$
$$O_2 = 2$$
$$O_2^- = 1.5$$
$$O_2^{2-} = 1$$

**11.** The radius of third orbit of H-atom is r₃ pm and radius of fourth orbit of H-atom is r₄ pm. The ratio of r₃ to r₄ is

(1) 9 : 16

(2) 16 : 9

(3) 4 : 3

(4) 3 : 4

**Sol.** Answer (1)

For H-atom, Z = 1

$$r_n \propto \frac{n^2}{Z}$$

$$\frac{r_3}{r_4} = \frac{3^2}{4^2} = \frac{9}{16}$$

**12.** **Statement I :** As the value of $\Delta G^\circ$ decreases, the metal oxide becomes more stable.

**Statement II :** As the value of $\Delta G^\circ$ increases then the metal having lower value of $\Delta G^\circ$ displaces the other metal.

The correct statements are,

(1) Both (1) and (2)   (2) Only (1)

(3) Only (2)   (4) Neither (1)

**Sol.** Answer (1)

**Statement-1 :** As the value of $\Delta G^O$ decreases. The metal oxide becomes more stable

**Statement-2 :** As the value of $\Delta G^\circ$ increases, then the metal having lesser value of $\Delta G^\circ$ displaces the other metal.
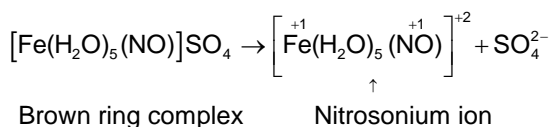
Both the statement-1 and 2 are correct.

**13.** Which of the following is wrong about Brown ring test.

(1) Brown ring forms at junction of two solutions.

(2) The brown ring complex is $(Fe(H_2O)_5NO)SO_4$

(3) If consists of ferrous nitro sulphate complex.

(4) $NO_3^- + \underset{(Conc.)}{H_2SO_4} \rightarrow$ Brown fumes are evolved

(1) 1   (2) 2

(3) 3   (4) 4

**Sol.** Answer (3)

Nitrate ions react with $FeSO_4$ in presence of conc $H_2SO_4$ which leads to the evolution of brown fumes and formation of brown ring complex at the junction.
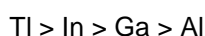
$$\left[Fe(H_2O)_5(NO)\right]SO_4 \rightarrow \left[\overset{+1}{Fe}(H_2O)_5\overset{+1}{(NO)}\right]^{+2} + SO_4^{2-}$$

Brown ring complex        Nitrosonium ion

**14.** Order of stability of +1 oxidation state of $13^{th}$ group elements is,

(1) Ga > In > Tl > Al   (2) Tl > In > Ga > Al

(3) In > Te > Al > Ga   (4) Al > Ga > In > Te

**Sol.** Answer (2)

Due to inert pair effect stability of +1 oxidation state (although max OS+3) increases down the group, hence the order of stability is

Tl > In > Ga > Al

**15.** The increasing order of melting point of Alkaline earth metals is

(1) Mg < Ca < Sr < Be

(2) Mg < Sr < Ca < Be

(3) Be < Sr < Ca < Mg

(4) Sr < Be < Mg < Ca

**Sol.** Answer (2)

The MP trend of alkaline earth metals is not systematic due to low ionisation enthalpy and strong electropositive nature.

The increasing order of MP of Alkaline earth metals.

Mg < Ba < Sr < Ca < Be

∴ Option (2) is correct answer

**16.** 35% by mass of HCl solution has density 1.46 g/ml. Find the molarity.

(1) 12 M   (2) 14 M

(3) 9 M   (4) 16 M

**Sol.** Answer (2)

$\dfrac{w}{w}\% = 35\,g$

$w_{HCl} = 35g$

$w_{soln} = 100g$

$d_{sol} = 1.46$ g/ml        $d_{sol} = \dfrac{w_{soln}}{v_{soln}}$

$v_{soln} = \dfrac{100}{1.46}$

$n_{HCl} = \dfrac{w_{HCl}}{M_{HCl}} = \dfrac{35}{1+35.5} = \dfrac{35}{36.5}$

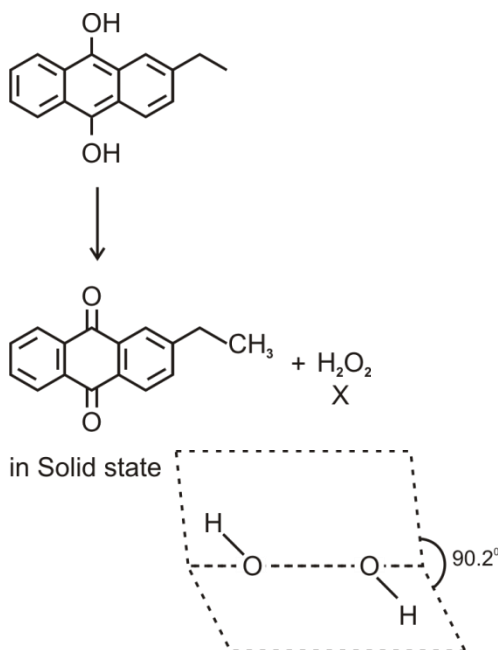$M_{HCl} = \dfrac{n_{HCl}}{v_{soln}\,(in\,L)} = \dfrac{35}{36.5} \times \dfrac{1000}{\dfrac{100}{1.46}}$

$= \dfrac{35 \times 1000 \times 1.46}{36.5 \times 100} = 14M$

Option 2 is correct

**17.** Ethylanthraquinol is oxidised to form ethylanthraquinone and compound X. The dihedral angle of X in solid state is

(1) $111.5^0$

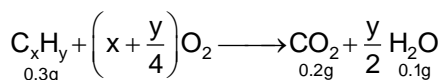(2) $90.2^0$

(3) $95.8^0$

(4) $101.9^0$

**Sol.** Answer (2)



**18.** 0.30 g of organic compound on combustion gives 0.30 g of $CO_2$ and 0.10 g of $H_2O$ and side products. Find the percentage by mass of carbon present in the organic compound

[Round off to the nearest integer]

**Sol.** Answer (18)

$$\underset{0.3g}{C_xH_y} + \left(x + \frac{y}{4}\right)O_2 \longrightarrow \underset{0.2g}{CO_2} + \underset{0.1g}{\frac{y}{2} H_2O}$$

1 mole $C_xH_y \rightarrow x$ moles of $CO_2$
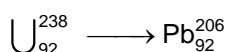
moles of $CO_2 = \dfrac{0.2}{44}$

Moles of C in compound = x = $4.545 \times 10^{-3}$

m % of carbon

$= 4.545 \times 10^{-3} \times \dfrac{12}{0.3} \times 100 = 18.18\%$

Nearest integer = 18

**19.** Consider the following radioactive decay,

$$U^{238}_{92} \longrightarrow Pb^{206}_{92}$$

Find the total no. of α and β particles emitted.

**Sol.** Answer (14)

$$U^{238}_{92} \longrightarrow Pb^{206}_{92} + \quad x^4_2He + \quad y^0_{-1}\beta$$

$\dfrac{238 - 206}{4} = x = 8$
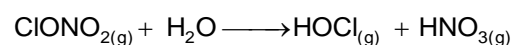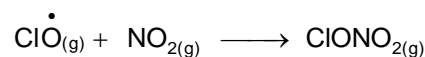
y = 6

x + y = 14

**20.** Polar stratospheric clouds results in the formation of : -

(1) $ClONO_2$      (2) HOCl

(3) ClO      (4) $CH_4$

**Sol.** Answer (1 & 2)

The polar stratospheric clouds provides surface on which chlorine nitrate formed gets hydrolysed to form hypochlorus acid
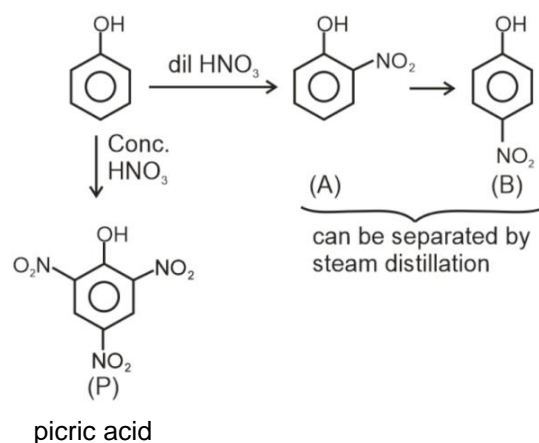
$$\overset{\bullet}{Cl}O_{(g)} + NO_{2(g)} \longrightarrow ClONO_{2(g)}$$

$$ClONO_{2(g)} + H_2O \longrightarrow HOCl_{(g)} + HNO_{3(g)}$$

∴ Option (1) & (2) both are correct answer

**21.** A compound reacts with dil. $HNO_3$ gives products A and B which can separated using steam distillation. When reacted with conc. $HNO_3$ it gives product P. Name the product P.

(1) picric acid      (2) ortho-nitrophenol

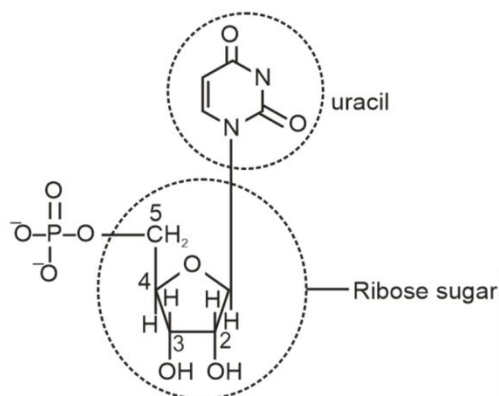(3) para- nitrophenol      (4) salicylaldehyde

**Sol.** Answer (1)



picric acid

**22.** How many oxygen atoms are present in nucleotide which is only present in RNA.

**Sol.** Answer (9)

Nucleotide: A nucleoside which is attached through its sugar to phosphoric acid



Number of oxygen atoms = 9

**23.** 0.5% KCl solution has depression in freezing point of 0.24 K. Calculate the degree of dissociation of KCl
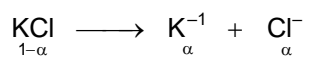
Given: $K_f$ (water) = 1.86 K kg mol$^{-1}$

**Sol.** Answer (0.913)

$$\Delta T_f = i \times K_f \times m$$

0.5% w/w KCl solution

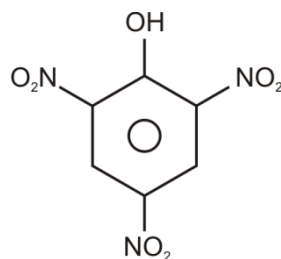$$\Rightarrow 0.24 = i \times 1.86 \times \left( \frac{0.5/74.5}{(99.5/1000)} \right)$$

i = 1.913

$$\underset{1-\alpha}{KCl} \longrightarrow \underset{\alpha}{K^{-1}} + \underset{\alpha}{Cl^-}$$

i = 1 + α = 1.913

α = 0.913

$\Rightarrow$ Degree of dissociation = 0.913

**24.** Number of oxygen atoms present in the picric acid

**Sol.** Answer (7)



Number of oxygen atoms = (2 × 3) + 1 = 7

❑   ❑   ❑