

# JEE Main 2020 Paper

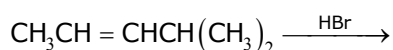


Date : 5<sup>th</sup> September 2020

Time : 02 : 00 pm - 05 : 00 pm

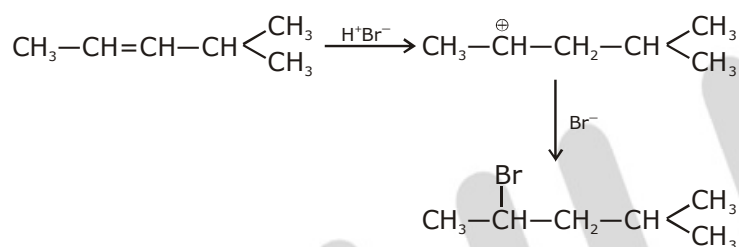
Subject : Chemistry

1. The major product formed in the following reaction is :



- (1)  $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{CH}(\text{CH}_3)_2$  (2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}(\text{Br})(\text{CH}_3)_2$   
(3)  $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}(\text{CH}_3)_2$  (4)  $\text{Br}(\text{CH}_2)_3\text{CH}(\text{CH}_3)_2$

Sol. 1



2. Hydrogen peroxide, in the pure state, is :

- (1) Linear and blue in color (2) Linear and almost colorless  
(3) Non-planar and almost colorless (4) Planar and blue in color

Sol. 3

$\text{H}_2\text{O}_2$  has openbook structure it is non planar

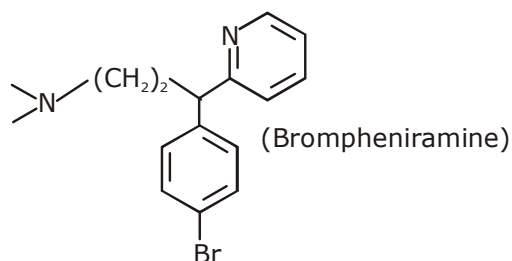
3. Boron and silicon of very high purity can be obtained through :

- (1) Liquefaction (2) Electrolytic refining  
(3) Zone refining (4) Vapour phase refining

Sol. 3

Fact

4. The following molecule acts as an :



- (1) Anti-histamine (2) Antiseptic (3) Anti-depressant (4) Anti-bacterial

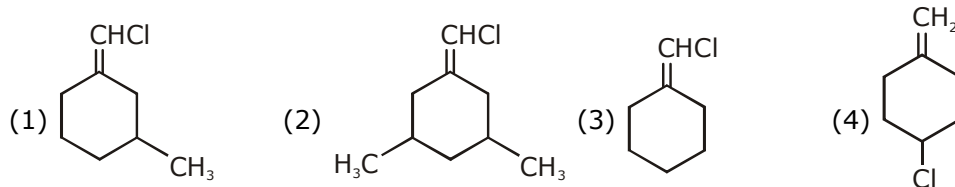
Sol. 1

Anti-histamine

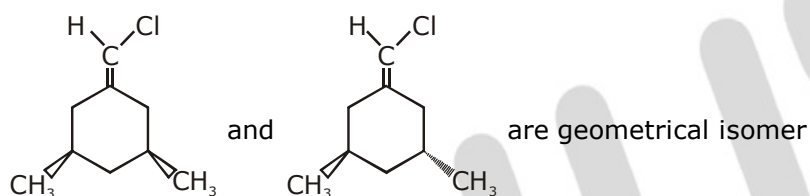
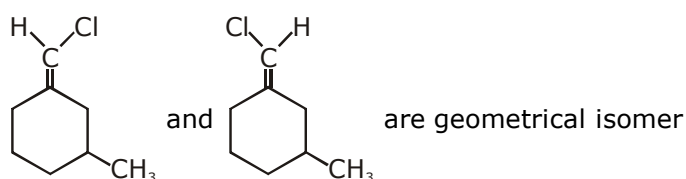
# JEE Main 2020 Paper



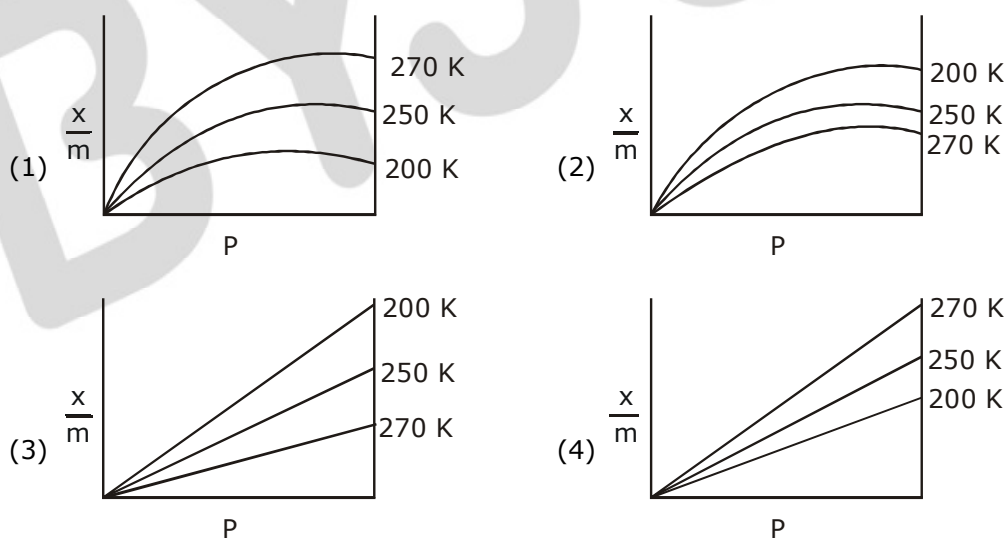
5. Among the following compounds, geometrical isomerism is exhibited by :



Sol. 1 & 2



6. Adsorption of a gas follows Freundlich adsorption isotherm. If  $x$  is the mass of the gas adsorbed on mass  $m$  of the adsorbent, the correct plot of  $\frac{x}{m}$  versus  $p$  is :



Sol. 2

As temp. increases extent of Adsorption decreases  
Therefore correct option (2)

$$\frac{x}{m} = KP^{1/n}$$

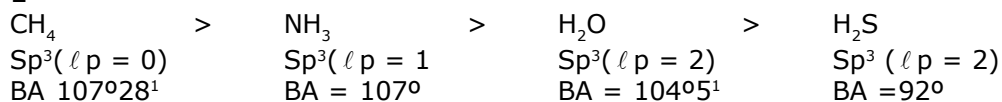
$\frac{x}{m}$  v/s  $P \rightarrow$  non linear curve

## JEE Main 2020 Paper



7. The compound that has the largest H-M-H bond angle (M=N, O, S, C) is :  
 (1) CH<sub>4</sub>                      (2) H<sub>2</sub>S                      (3) NH<sub>3</sub>                      (4) H<sub>2</sub>O

**Sol. 1**



8. The correct statement about probability density (except at infinite distance from nucleus) is :

- (1) It can be zero for 3p orbital                      (2) It can be zero for 1s orbital  
 (3) It can never be zero for 2s orbital                      (4) It can negative for 2p orbital

**Sol. 1**

$$\psi_{R/S}^2 > 0 \text{ always}$$

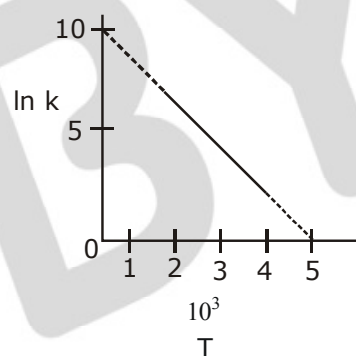
$$\psi_{R/S}^2 \text{ can be } = 0; \text{ As '2s' has 1 Radial Node}$$

$$\psi_R^2 \text{ can never be negative}$$

$$\psi_R^2 \text{ (3P) can be } = 0 \text{ as 3P has Radial Nodes}$$

Ans. Option (1)

9. The rate constant (k) of a reaction is measured at different temperatures (T), and the data are plotted in the given figure. The activation energy of the reaction in kJ mol<sup>-1</sup> is : (R is gas constant)



- Sol. 4**                      (1) R                      (2) 2/R                      (3) 1/R                      (4) 2R

$$\ln(k) = \ln(A) - \frac{E_a}{R} \left( \frac{1}{T} \right)$$

$$\ln(A) = 10$$

$$\text{Slope} = \frac{-E_a}{R} \times 10^{-3} = -10/5$$

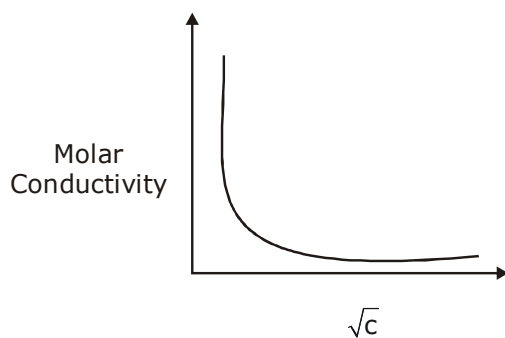
$$E_a = 2000R \text{ J/mol}$$

$$E_a = 2R \text{ KJ/mol}$$

# JEE Main 2020 Paper



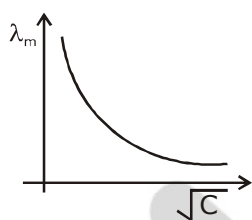
10. The variation of molar conductivity with concentration of an electrolyte (X) in aqueous solution is shown in the given figure.



The electrolyte X is :

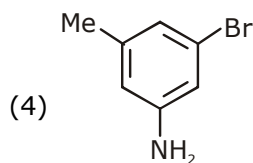
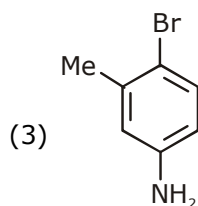
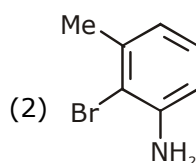
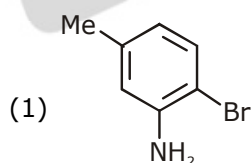
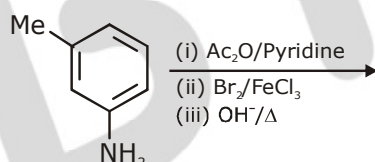
- (1) HCl                      (2) CH<sub>3</sub>COOH                      (3) NaCl                      (4) KNO<sub>3</sub>

Sol. 2



Such type of variation is always for weak electrolyte  
Hence Ans (2) CH<sub>3</sub>COOH

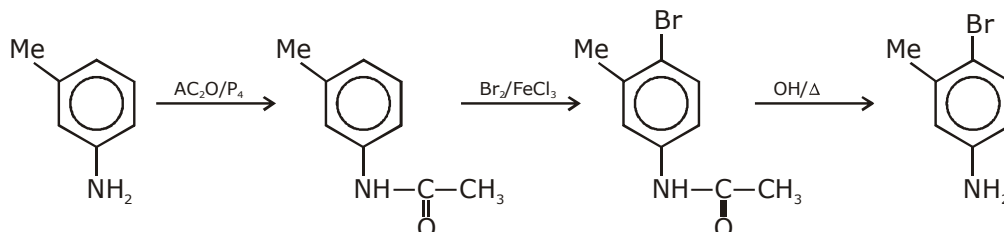
11. The final major product of the following reaction is :



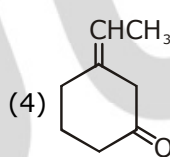
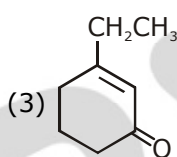
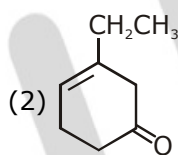
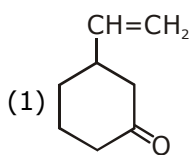
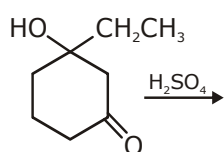
## JEE Main 2020 Paper



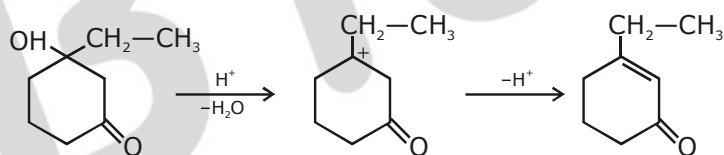
**Sol. 3**



**12.** The major product of the following reaction is :



**Sol. 3**



**13.** Lattice enthalpy and enthalpy of solution of NaCl are  $788 \text{ kJ mol}^{-1}$ , and  $4 \text{ kJ mol}^{-1}$ , respectively. The hydration enthalpy of NaCl is :

(1)  $-780 \text{ kJ mol}^{-1}$

(2)  $784 \text{ kJ mol}^{-1}$

(3)  $-784 \text{ kJ mol}^{-1}$

(4)  $780 \text{ kJ mol}^{-1}$

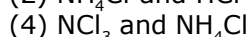
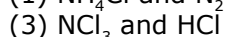
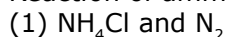
**Sol. 3**

$$\Delta H_{\text{sol}} = \text{L.E.} + \Delta H_{\text{hyd}}$$

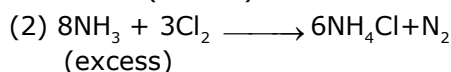
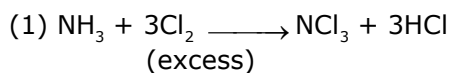
$$4 = 788 + \Delta H_{\text{hyd}}$$

$$\Delta H_{\text{hyd}} = -784 \text{ KJ/mol Ans}$$

**14.** Reaction of ammonia with excess  $\text{Cl}_2$  gives :



**Sol. 3**

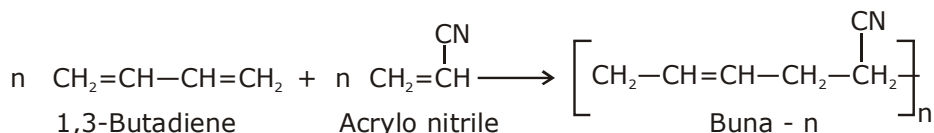


# JEE Main 2020 Paper



- 15.** Which one of the following polymers is not obtained by condensation polymerisation?  
 (1) Bakelite (2) Nylon 6  
 (3) Buna-N (4) Nylon 6, 6

**Sol. 2**



- 16.** Consider the complex ions, trans-[Co(en)<sub>2</sub>Cl<sub>2</sub>]<sup>+</sup> (A) and cis-[Co(en)<sub>2</sub>Cl<sub>2</sub>]<sup>+</sup> (B). The correct statement regarding them is :  
 (1) Both (A) and (B) can be optically active.  
 (2) (A) can be optically active, but (B) cannot be optically active.  
 (3) Both (A) and (B) cannot be optically active.  
 (4) (A) cannot be optically active, but (B) can be optically active.

**Sol. 4**

Due to presence of Pos (A) cannot be optically active, but (B) can be optically active

- 17.** An element crystallises in a face-centred cubic (fcc) unit cell with cell edge a. The distance between the centres of two nearest octahedral voids in the crystal lattice is :

- (1) a                                  (2)  $\frac{a}{2}$                                   (3)  $\sqrt{2}a$                                   (4)  $\frac{a}{\sqrt{2}}$

**Sol. 4**

Nearest octahedral voids  
 One along edge center & other at Body centre

$$\text{Distance} = \sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{a}{2}\right)^2} = \sqrt{2} \frac{a}{2}$$

$$= \frac{a}{\sqrt{2}} \text{ Ans.}$$

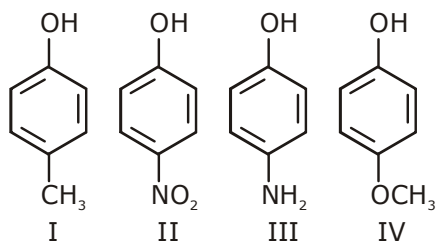
- 18.** The correct order of the ionic radii of O<sup>2-</sup>, N<sup>3-</sup>, F<sup>-</sup>, Mg<sup>2+</sup>, Na<sup>+</sup> and Al<sup>3+</sup> is :  
 (1) N<sup>3-</sup> < O<sup>2-</sup> < F<sup>-</sup> < Na<sup>+</sup> < Mg<sup>2+</sup> < Al<sup>3+</sup>                  (2) N<sup>3-</sup> < F<sup>-</sup> < O<sup>2-</sup> < Mg<sup>2+</sup> < Na<sup>+</sup> < Al<sup>3+</sup>  
 (3) Al<sup>3+</sup> < Na<sup>+</sup> < Mg<sup>2+</sup> < O<sup>2-</sup> < F<sup>-</sup> < N<sup>3-</sup>                  (4) Al<sup>3+</sup> < Mg<sup>2+</sup> < Na<sup>+</sup> < F<sup>-</sup> < O<sup>2-</sup> < N<sup>3-</sup>

**Sol. 4**

all are Isoelectronic

- (1)  $\frac{N^{3-}O^{2-}F^{-}Na^{+}Mg^{2+}Al^{3+}}{Z \uparrow, Z_{eff} \uparrow, \text{Ionic Radii} \downarrow}$   
 (2) Al<sup>3+</sup> < Mg<sup>2+</sup> < Na<sup>+</sup> < F<sup>-</sup> < O<sup>2-</sup> < N<sup>3-</sup>

- 19.** The increasing order of boiling points of the following compounds is :

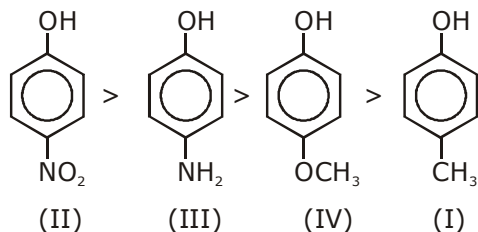


- (1) I < III < IV < II                                  (2) IV < I < II < III  
 (3) I < IV < III < II                                  (4) III < I < II < IV

# JEE Main 2020 Paper



**Sol. 3**

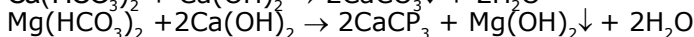
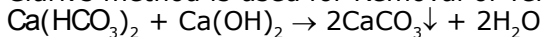


**20.** The one that is NOT suitable for the removal of permanent hardness of water is :

- (1) Ion-exchange method                      (2) Calgon's method  
 (3) Treatment with sodium carbonate      (4) Clark's method

**Sol. 4**

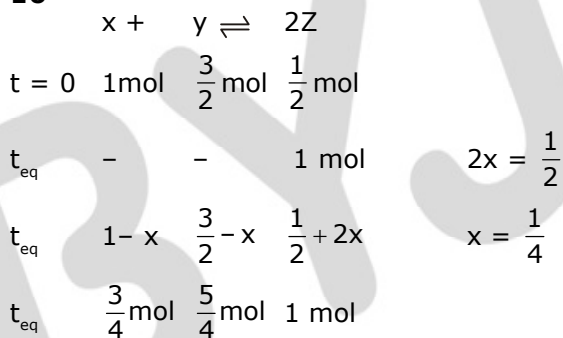
Clark's method is used for Removal of Temporary hardness



**21.** For a reaction  $X + Y \rightleftharpoons 2Z$ , 1.0 mol of X, 1.5 mol of Y and 0.5 mol of Z were taken in a 1 L vessel and allowed to react. At equilibrium, the concentration of Z was 1.0

mol L<sup>-1</sup>. The equilibrium constant of reaction is  $\frac{x}{15}$ . The value of x is

**Sol. 16**



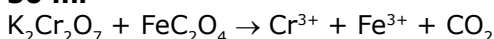
$$K_{\text{eq}} = \frac{(1)^2}{\frac{5}{4} \times \frac{3}{4}} = \frac{16}{15}$$

$$x = 16 \text{ Ans.}$$

**22.** The volume, in mL, of 0.02 M K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution required to react with 0.288 g of ferrous oxalate in acidic medium is \_\_\_\_\_.

(Molar mass of Fe = 56 g mol<sup>-1</sup>)

**Sol. 50 ml**



$$\frac{0.02 \times \text{vol} \times 6}{1000} = 3 \times \frac{0.288}{144} \times 100$$

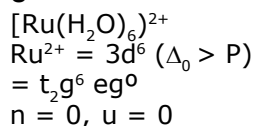
$$\text{Vol.} = \frac{200}{4} = 50 \text{ ml Ans.}$$

# JEE Main 2020 Paper



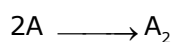
**23.** Considering that  $\Delta_0 > P$ , the magnetic moment (in BM) of  $[\text{Ru}(\text{H}_2\text{O})_6]^{2+}$  would be \_\_\_\_\_.

**Sol.** **0**



**24.** For a dimerization reaction,  $2\text{A}(\text{g}) \rightarrow \text{A}_2(\text{g})$  at 298 K,  $\Delta U^\ominus = -20 \text{ kJ mol}^{-1}$ ,  $\Delta S^\ominus = -30 \text{ kJ mol}^{-1}$ , then the  $\Delta G^\ominus$  will be \_\_\_\_\_ J.

**Sol.** **-13538 J**



$$\Delta U^\ominus = -20 \text{ kJ}$$

$$\Delta H^\ominus = -20000 + (-1) R \times 298$$

$$\Delta G^\ominus = -20000 - 298R + 30 \times 298$$

$$\Delta G^\ominus = -20,000 + 298 \left( \frac{90 - 25}{3} \right)$$

$$\Delta G^\ominus = 20,000 + \frac{298 \times 65}{3}$$

$$\Delta G^\ominus = -13538 \text{ J}$$

**25.** The number of chiral carbons present in sucrose is \_\_\_\_\_.

**Sol.** **9**

