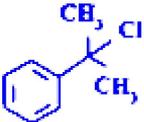


# Haloalkanes and Haloarenes

## Question1

The organic compound  can be classified as \_\_\_\_\_

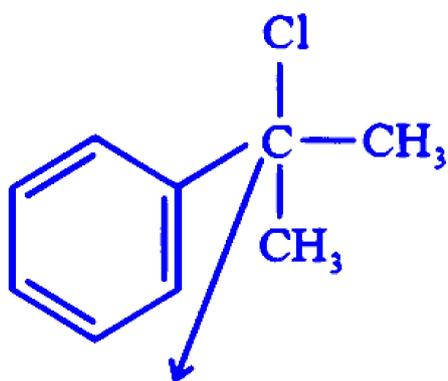
**KCET 2025**

**Options:**

- A. Allylic halide
- B. Benzyl halide
- C. Aryl halide
- D. Alkyl halide

**Answer: B**

**Solution:**



**Benzylic Position**



## Question2

Chlorobenzene reacts with bromine gas in the presence of Anhydrous  $\text{AlBr}_3$  to yield p-Bromochlorobenzene. This reaction is classified as \_\_\_\_\_

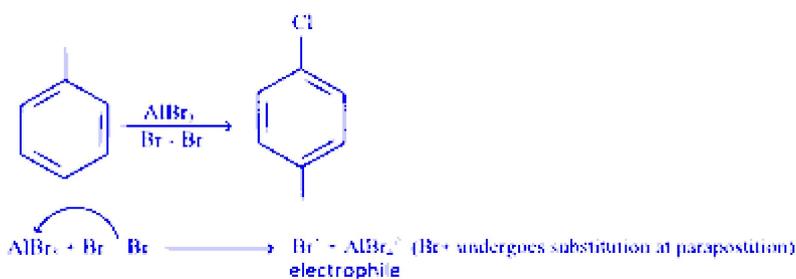
### KCET 2025

Options:

- A. Elimination reaction
- B. Nucleophilic substitution reaction
- C. Electrophilic substitution reaction
- D. Addition reaction

**Answer: C**

**Solution:**

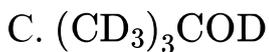
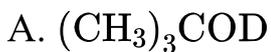


## Question3

The organometallic compound  $(\text{CH}_3)_3\text{CMgBr}$  on reaction with  $\text{D}_2\text{O}$  produces \_\_\_\_\_

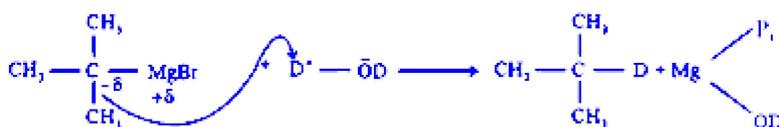
### KCET 2025

**Options:**



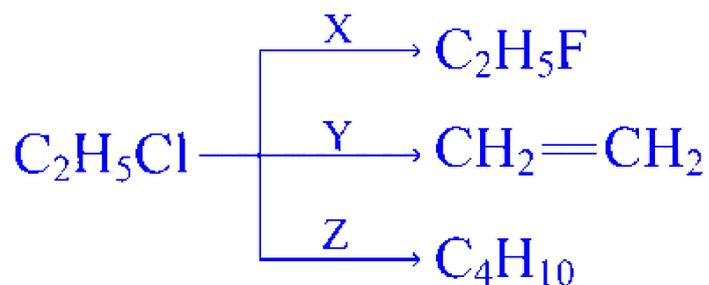
**Answer: D**

**Solution:**



## Question4

**In the following scheme of reaction.**



**X, y and Z respectively are**

## KCET 2024

**Options:**

A. AgF , alcoholic KOH and benzene

B. HF, aqueous KOH and Na in dry ether

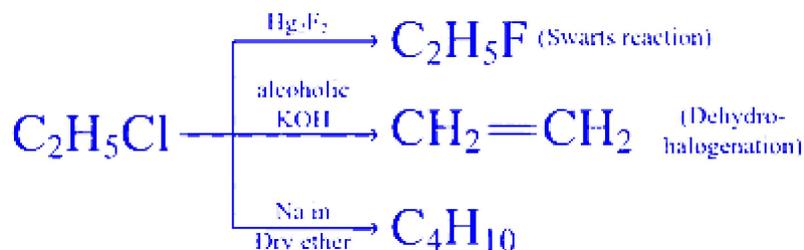
C.  $\text{Hg}_2\text{F}_2$ , alcoholic KOH and Na in dry ether

D.  $\text{CoF}_2$ , aqueous KOH and benzene

**Answer: C**

**Solution:**

In the given scheme of reaction, X, Y and Z are  $\text{Hg}_2\text{F}_2$ , alc. KOH and Na in dry ether respectively.



## Question 5

**A haloalkane undergoes  $\text{S}_{\text{N}}2$  or  $\text{S}_{\text{N}}1$  reaction depending on**

**KCET 2024**

**Options:**

A. solvent used in the reaction

B. low temperature

C. the type of halogen atom

D. stability of the haloalkane

**Answer: A**

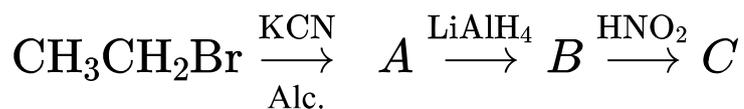
**Solution:**

- Haloalkanes undergoing  $\text{S}_{\text{N}}2$  or  $\text{S}_{\text{N}}1$  reaction depends upon the solvent used in the reaction.
- $\text{S}_{\text{N}}2$  reactions are generally carried out in polar aprotic solvent while  $\text{S}_{\text{N}}1$  reactions are carried out in polar protic solvents.



## Question6

Identify A, B and C in the sequence.



KCET 2023

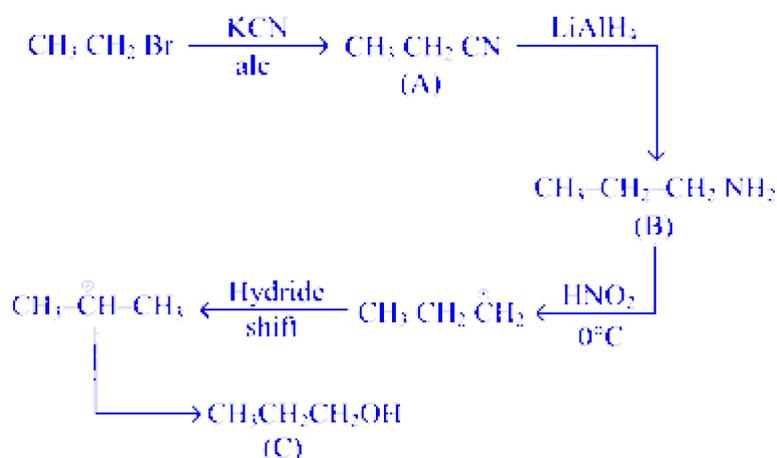
Options:



Answer: A

Solution:

The given sequence of reaction is as follows



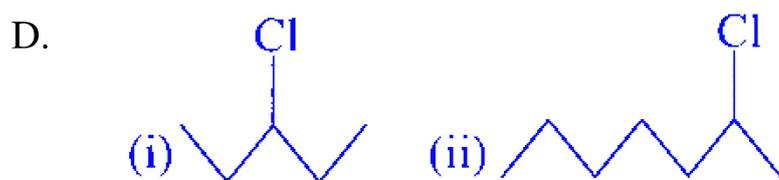
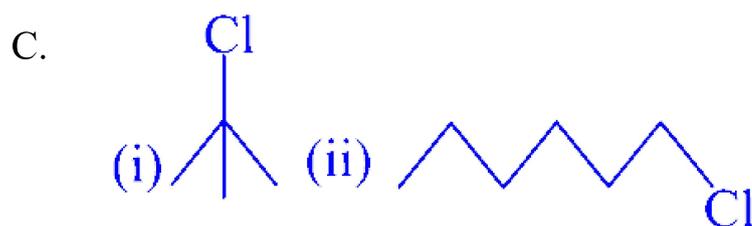
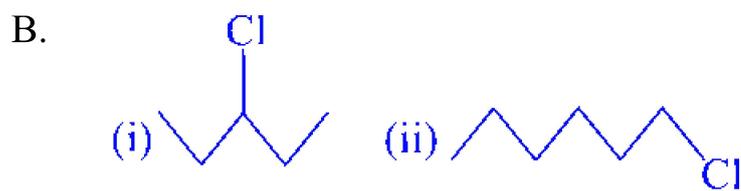
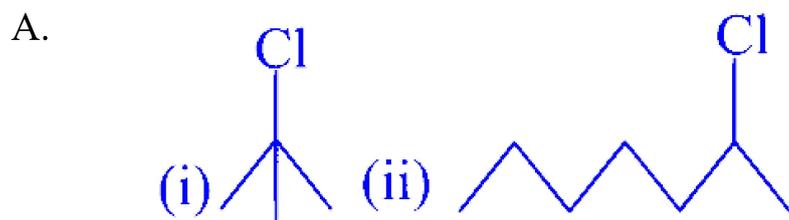
## Question 7

In the following pairs of halogen compounds, which compound undergoes faster  $S_N1$  reaction?



### KCET 2022

Options:

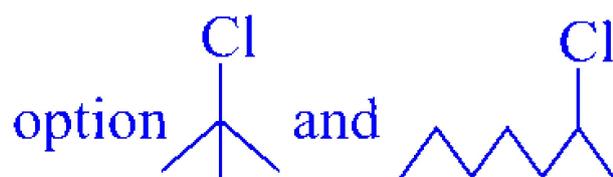


Answer: A



## Solution:

The reactivity of compound under  $S_N1$  reaction is  $3^\circ > 2^\circ > 1^\circ$ . Thus, among the given



undergoes faster  $S_N1$  reaction.

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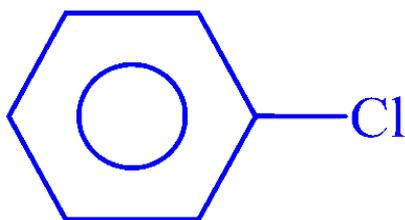
## Question8

Which one of the following chlorohydrocarbon readily undergoes solvolysis?

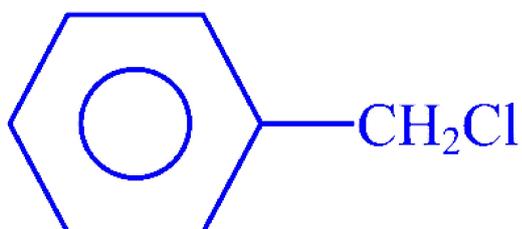
KCET 2022

Options:

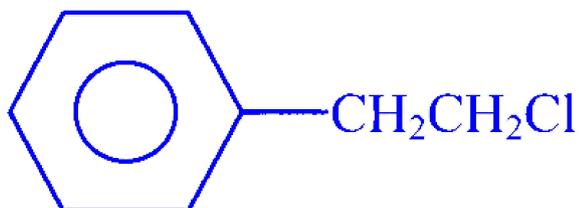
A.



B.



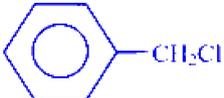
C.



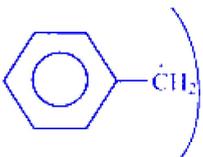
D.  $\text{CH}_2 = \text{CHCl}$

**Answer: B**

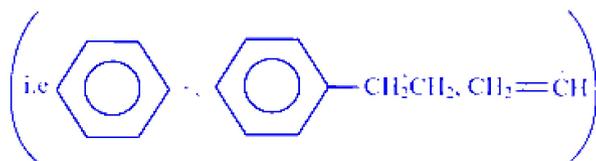
**Solution:**

Among the given option 

will readily undergo solvolysis because its

carbocation (i.e. ) Produce after

the solvolysis is resonance stabilised and is stable than the other carbocation



## Question9

**Peroxide effect is observed with the addition of HBr but not with the addition of HI to unsymmetrical alkene because**

**KCET 2021**

**Options:**

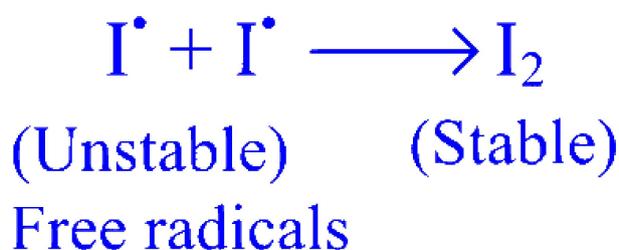
- A. H – I bond is stronger than H – Br and is not cleaved by the free radical
- B. H – I bond is weaker than H – Br bond so that iodine free radicals combine to form iodine molecules
- C. Bond strength of HI and HBr are same but free radicals are formed in HBr
- D. All of the above

**Answer: B**

**Solution:**

Peroxide effect is observed with addition of HBr but not with the addition of H – I to unsymmetrical alkene because H – I bond is weaker than H – Br bond. So, unstable iodine free radicals combine to form stable iodine molecules as

i.e.,



# Question10

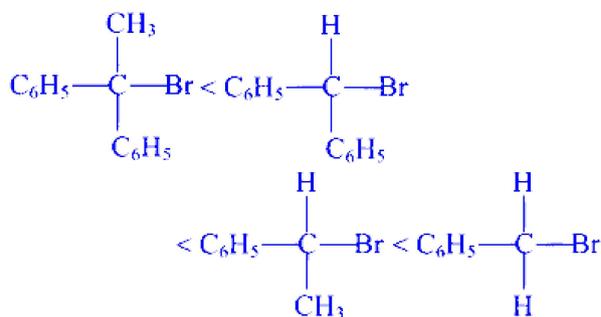
The order of reactivity of the compounds

$C_6H_5CH_2Br$ ,  $C_6H_5CH(C_6H_5)Br$ ,  $C_6H_5CH(CH_3)Br$  and  $C_6H_5C(CH_3)(C_6H_5)Br$  in  $S_N2$  reaction is

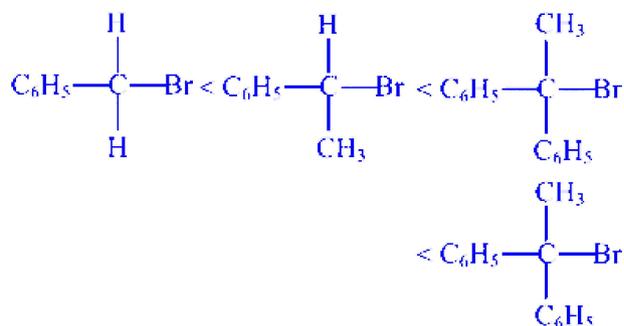
KCET 2021

Options:

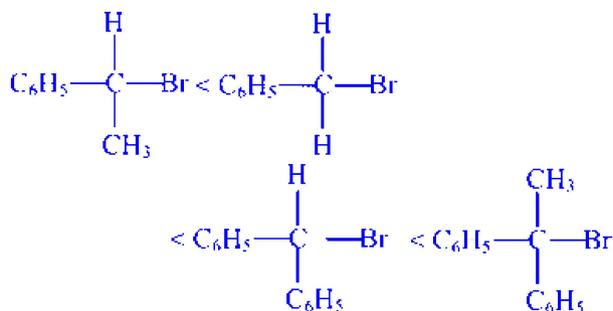
A.



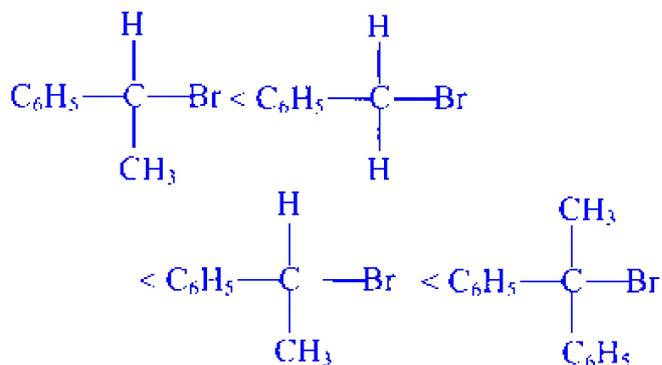
B.



C.



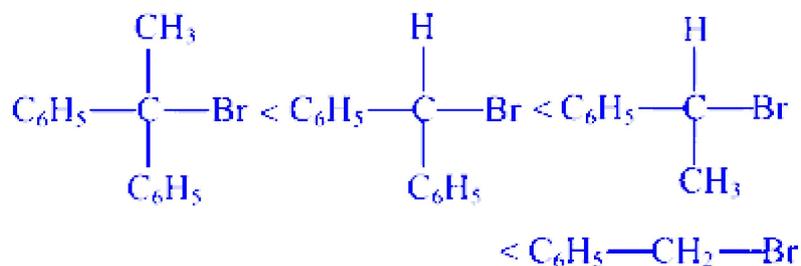
D.



**Answer: A**

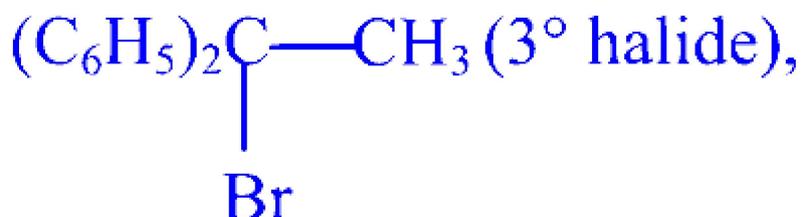
### Solution:

The order of reactivity of given compounds in  $S_N2$  reaction is



For  $S_N2$  reaction, the order of reaction is inversely proportional to steric hindrance caused by bulky groups.

In



there are two bulky groups present i.e. benzene group and one methyl group which provide steric hindrance for the attack of nucleophile. Hence, it is least reactive while in  $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$  ( $1^\circ$  halide), the attack of nucleophile is easier due to less steric hindrance.

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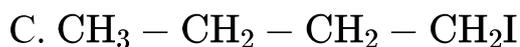
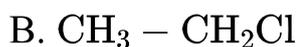
## Question 11

Which of the following halide shows highest reactivity towards  $S_N1$  reaction?

**KCET 2020**



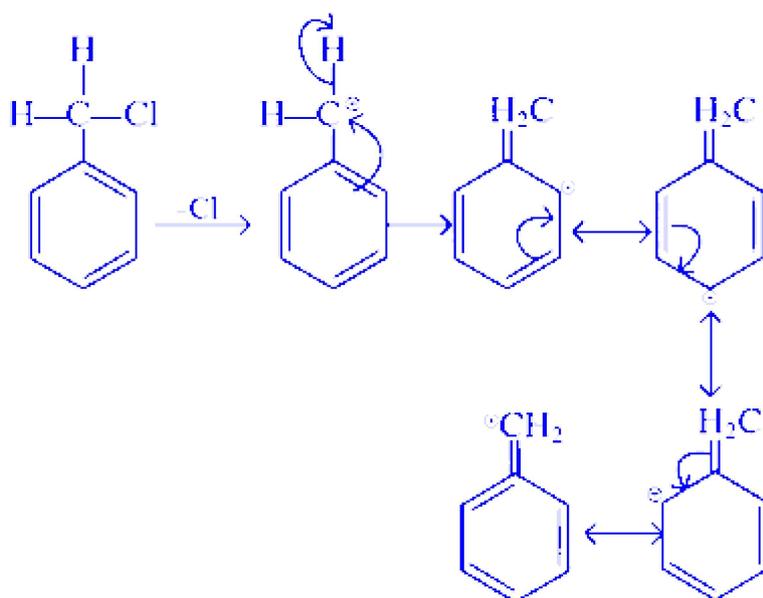
**Options:**



**Answer: A**

**Solution:**

The order of reactivity of halides for  $S_N1$  reaction is  $3^\circ > 2^\circ > 1^\circ$  as the stability of carbocation formed in  $S_N1$  will be highest for  $3^\circ$  and lowest for  $1^\circ$ . Here,  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$  will show highest reactivity for  $S_N1$  mechanism as the carbocation left after removal of  $\text{Cl}^-$  is resonance stabilised.



So,  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$  will show highest reactivity towards  $S_N1$  reaction.

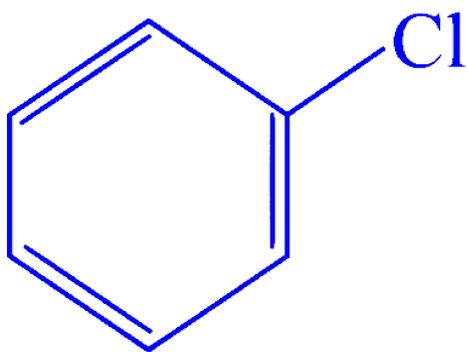
## Question12

**Which of the following halide undergoes hydrolysis on warming with water/aqueous NaOH ?**

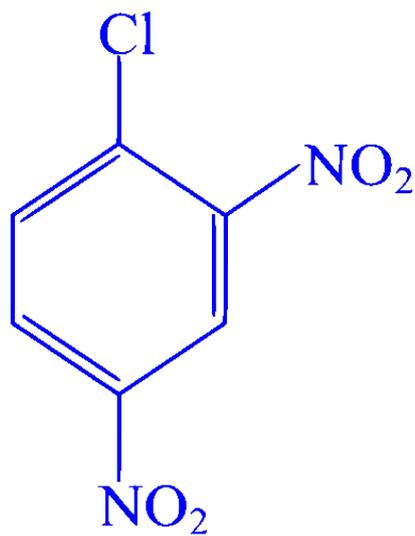
**KCET 2019**

**Options:**

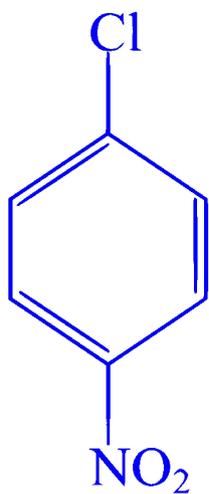
A.



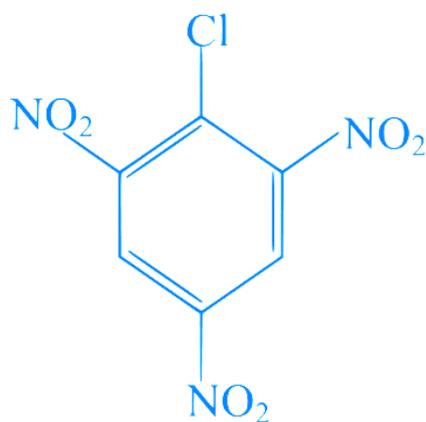
B.



C.



D.

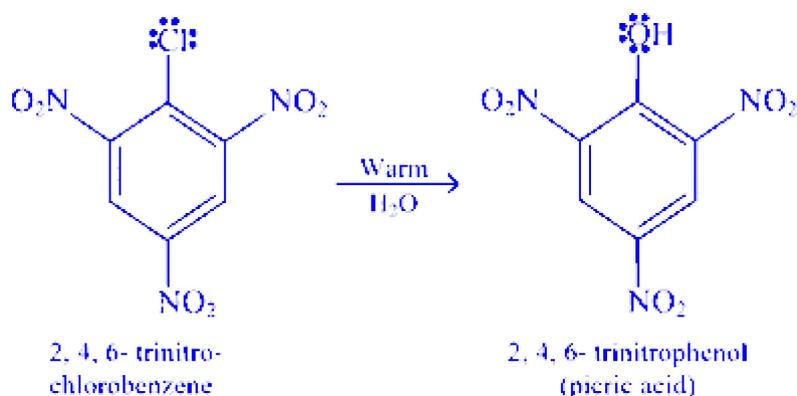


**Answer: D**

## Solution:

Option (d), i.e. 2, 4, 6 trinitrochlorobenzene readily undergoes hydrolysis on warming with water/aqueous NaOH. Presence of electron withdrawing groups such as  $-\text{NO}_2$  at *Q* and *p*-position of haloarenes with respect to halogen greatly activates the halogen towards nucleophilic substitution

Reaction of 2,4,6-trinitrochlorobenzene with warm water is as follows :



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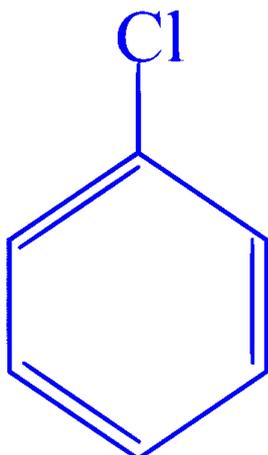
## Question13

The compound having longest C–Cl bond is

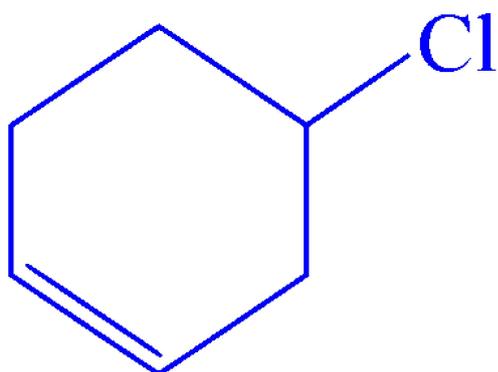
**KCET 2019**

Options:

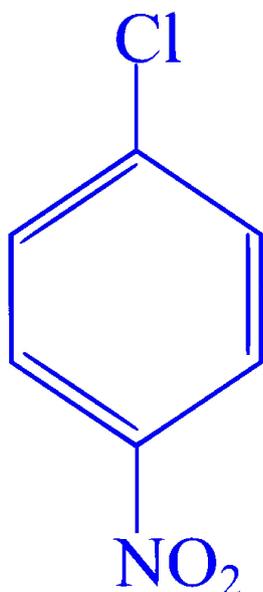
A.



B.



C.



D.  $\text{CH}_2 = \text{CH} - \text{Cl}$

**Answer: B**

**Solution:**

The compound having longest C – Cl bond is option (b), i.e. 3-chlorocyclohex-1-ene. In this molecule, carbon bond is  $sp^3$ -hybridised having 25%  $s$ -character. Option (a), (c) and (d) have  $sp^2$  hybridised C-atom

with greater  $s$ -character (i.e. 33.3%  $s$ -character).  $sp^2$ -hybridised C-atom is more electronegative than  $sp^3$ -hybridised C-atom. It can hold the electron pair of the bond more tightly than  $sp^3$ -hybridised. As a result, C – X bond in option (a), (c) and (d) is shorter than option (b).

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## Question14

Which of the following statements is true is case of alkyl halides?

**KCET 2018**

**Options:**

- A. They are polar in nature
- B. They can form hydrogen bonds
- C. They are highly soluble in water
- D. They undergo addition reactions

**Answer: A**

**Solution:**

Let's analyze each option:

**Option A: They are polar in nature**

Alkyl halides have a C–X bond (where X is a halogen such as Cl, Br, or I).

The halogen is more electronegative than carbon, which creates a dipole in the bond.

Even though the overall molecular polarity can depend on the molecular structure, the presence of the C–X bond makes them polar in nature.

Therefore, Option A is true.

**Option B: They can form hydrogen bonds**

For a molecule to form hydrogen bonds, it must have a hydrogen atom attached to a highly electronegative atom like O, N, or F.

In alkyl halides, the hydrogens are bonded to carbon, not to the halogen.

Hence, they do not participate in hydrogen bonding.

**Option C: They are highly soluble in water**

While the C–X bond is polar, alkyl halides have relatively large nonpolar hydrocarbon parts.



This makes them largely insoluble in water since water is a highly polar solvent and mixes well only with similarly polar substances.

**Option D: They undergo addition reactions**

Addition reactions typically occur with unsaturated compounds (such as alkenes or alkynes).

Alkyl halides are saturated compounds (only  $\sigma$  bonds) and do not undergo addition reactions under normal conditions.

Given the explanations, the correct statement is:

**Option A: They are polar in nature**

---

## Question 15

**Tertiary alkyl halide is practically inert to substitution by  $S_N2$  mechanism because of**

**KCET 2018**

**Options:**

- A. insolubility
- B. instability
- C. inductive effect
- D. steric hindrance

**Answer: D**

**Solution:**

The correct answer is Option D: steric hindrance.

Here's why:

In an  $S_N2$  reaction, the nucleophile must approach the electrophilic carbon from behind (the side opposite the leaving group) to displace it.

Tertiary alkyl halides have three bulky alkyl groups around the reactive carbon. These bulky groups create steric hindrance, which physically blocks the nucleophile from accessing the carbon center.

Because the nucleophile cannot effectively approach the electrophilic center, the  $S_N2$  reaction is significantly slowed down or doesn't occur at all.

Thus, tertiary alkyl halides are practically inert to substitution by the  $S_N2$  mechanism due to steric hindrance.

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## Question16

Toluene reacts with halogen in presence of iron (III) chloride giving ortho and para halo compounds. The reaction is

KCET 2017

Options:

- A. nucleophilic substitution reaction
- B. free radical addition reaction
- C. electrophilic elimination reaction
- D. electrophilic substitution reaction

**Answer: D**

**Solution:**

Electrophilic substitution reaction.

