Aldehyde and Ketone

Question1

$$\text{Toluene} \xrightarrow[\text{(ii)}\ \ H_3O^+]{\text{(i)}\ \ CrO_2Cl_2/CS_2} X \xrightarrow{\text{Conc.}\quad NaOH} Y + Z$$

The correct statements about Y and Z are

A. Y is a secondary alcohol.

B. Y is the reduction product of X.

C. Z on heating with sodalime gives benzene.

D. Y does not give H_2 gas with Na metal.

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Options:

A.

B and C only

B.

A and B only

C.

A and D only

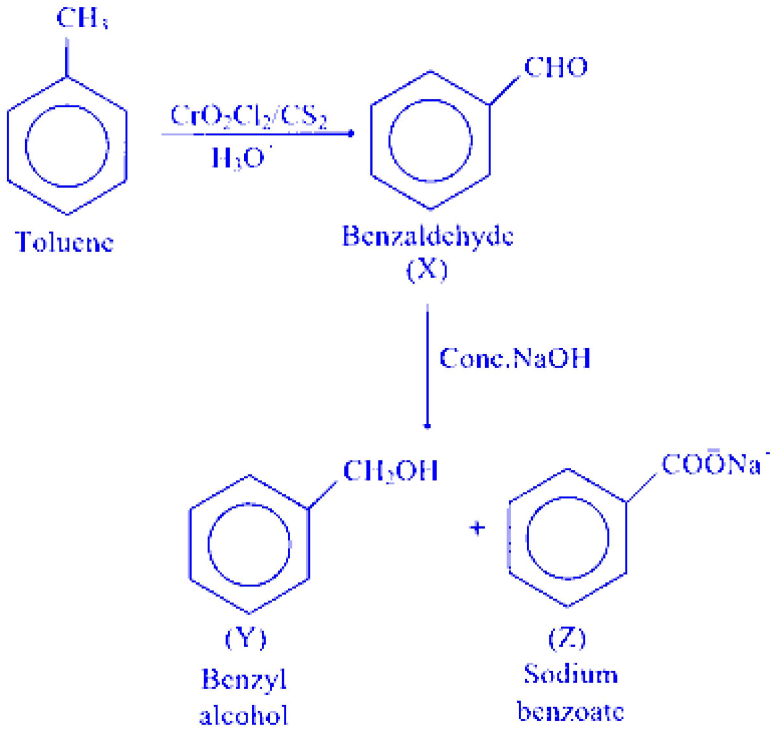
D.

B and D only

Answer: A

Solution:

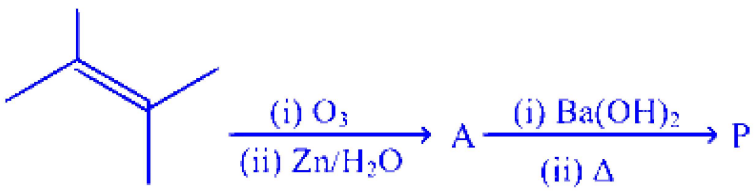
The complete reaction sequence is as follows.



Thus, statement given in *B* and *C* are correct. i.e., *Y* is the reduction product of *X* and *Z* on heating with sodalime gives benzene.

Question2

Identify the product ' *P* ' in the given reaction sequence.



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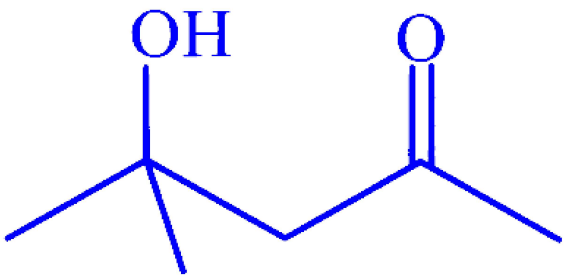
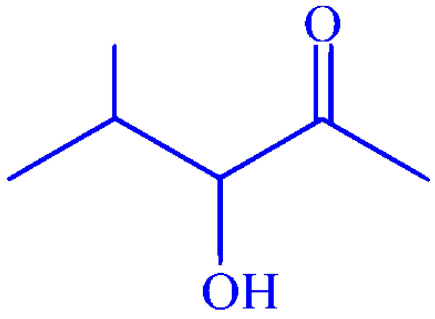
Options:

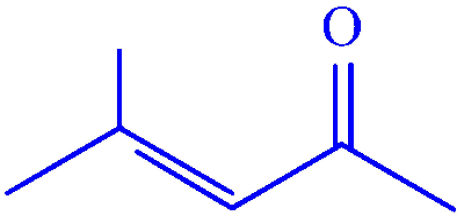
A.



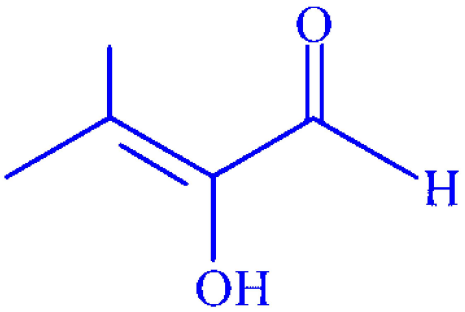
B.



C.



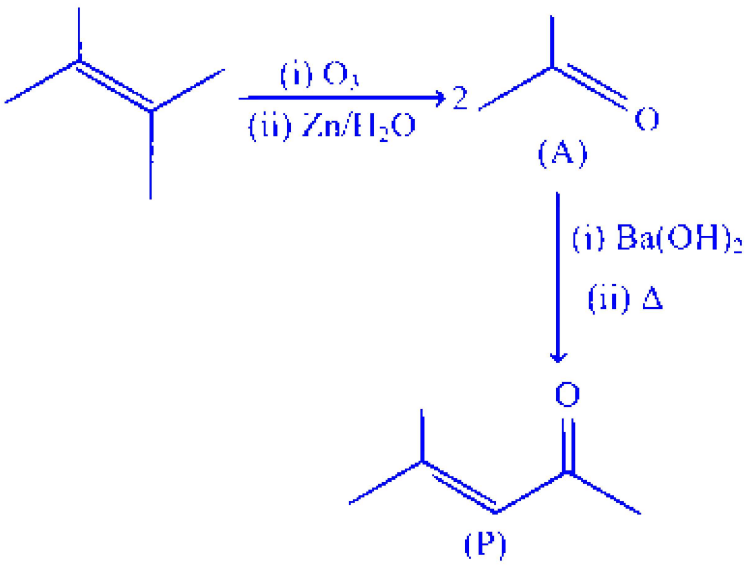
D.



Answer: C

Solution:

The complete sequence is as follows.



Question3

Consider the following reaction sequence. (A) and (C) are

$$CH_3CHO \xrightarrow[(ii)\ \ H_2O/H^+]{(i)\ \ CH_3MgBr} (A) \xrightarrow{H_5SO_4.\Delta} (B) \xrightarrow[(ii)\ \ H_2O,H_2O_2/OH^-]{(i)\ \ B_3H_6} (C)$$

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Options:

A.

functional isomers

B.

metamers

C.

optical isomers

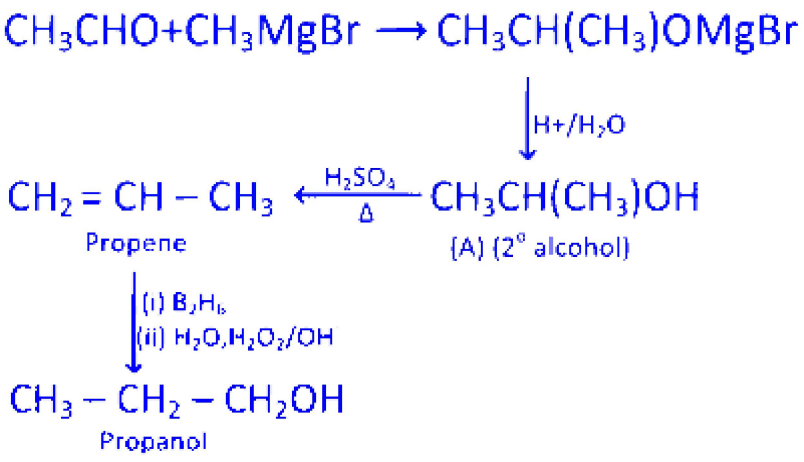
D.

position isomers

Answer: D

Solution:

The complete reaction is as follows,



Hence, A and C are position isomers.

Question4

Identify the end product (Z) in the sequence of the following reactions.

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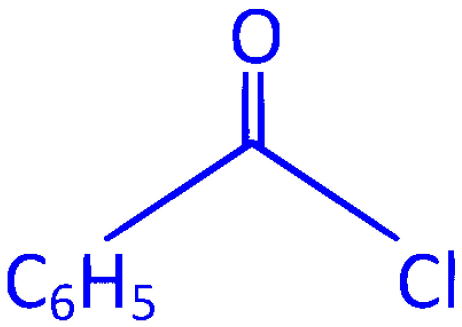
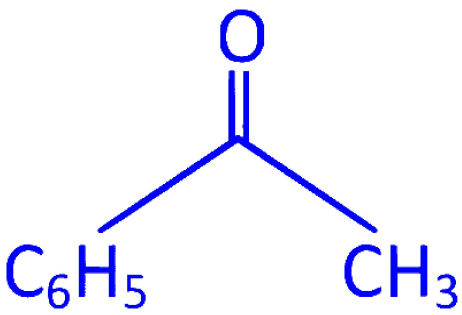
Options:

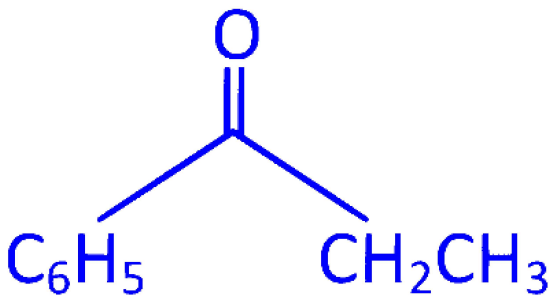
A.



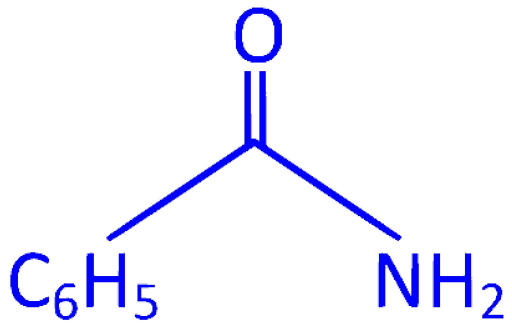
B.



C.

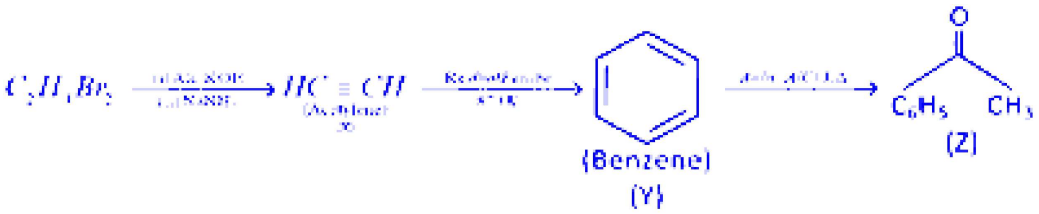


D.



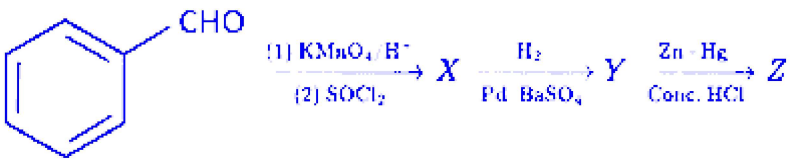
Answer: B

Solution:



Question5

What is ' Z ' in the given sequence of reactions?



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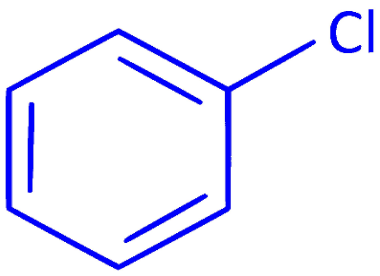
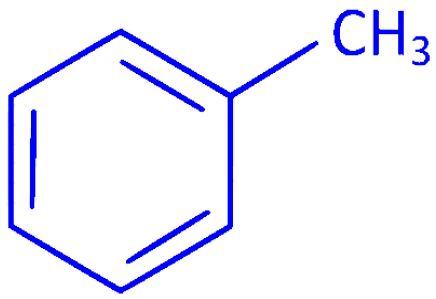
Options:

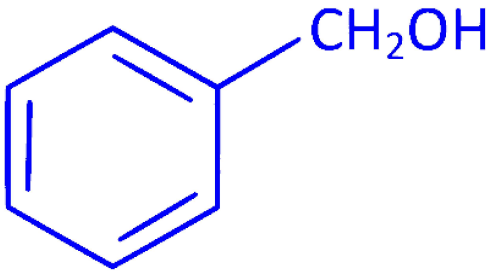
A.



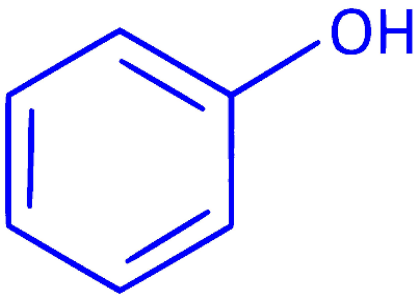
B.



C.



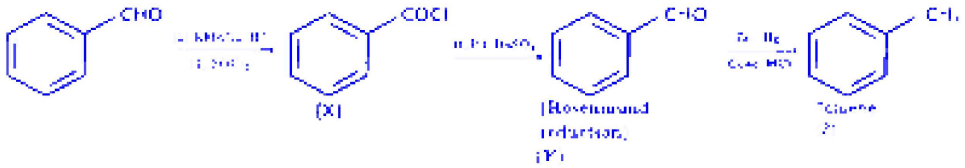
D.



Answer: B

Solution:

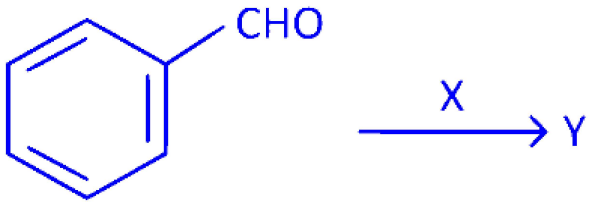
The complete reaction sequence is as follows



The compound Z is toluene.

Question6

Identify the set, in which X and Y are correctly matched



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Options:

A. NH_2OH, Hydrazone

B. NH_2NH_2, Semicarbazone

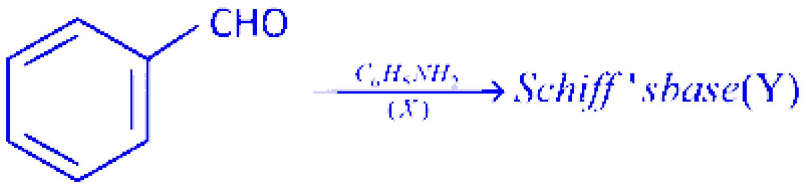
C. $C_6H_5NH_2$, Schiff base

D. RNH_2, Oxime

Answer: C

Solution:

Benzaldehyde or its derivatives reacts with a primary amine to form a Schiff's base.



Thus Xand Y are $C_6H_5NH_2$ and Schiff's base respectively.

Question7

$$CH_3CH_2OH \xrightarrow[443\ K]{\text{Conc. } H_2SO_4} X \xrightarrow[(ii)\ Zn/H_2O\ (2Moless)]{(i)\ O_3} Y \xrightarrow[(i)\ H^+]{\text{(i) Conc. NaOH}} Z$$

Z is a mixture of alcohol and acid. Reaction of conversion of Y to Z is

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Options:

A. Reimer-Tiemann reaction

B. Kolbe's reaction

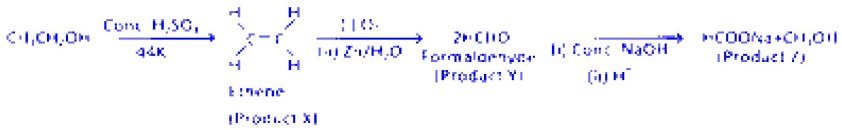
C. Cannizzaro reaction

D. Stephen reaction

Answer: C

Solution:

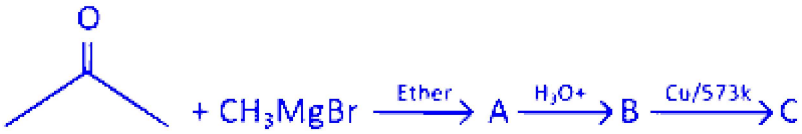
The complete reaction is as follow



Reaction of conversion of Y to Z is a Cannizzaro reaction. It involves 2 moles of aldehydes. One mole undergo oxidation to carboxylic acid. The other molecules goes reduction to corresponding alcohol.

Question8

What is ' C ' in the following reaction sequence?



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Options:

A. Propanone

B. 2-methlyl-2-propanol

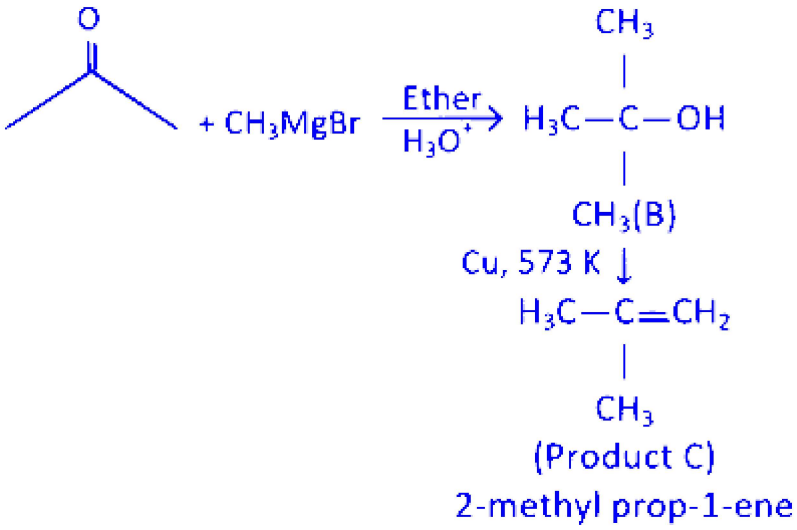
C. 2-methylprop-l-ene

D. But-2-enal

Answer: C

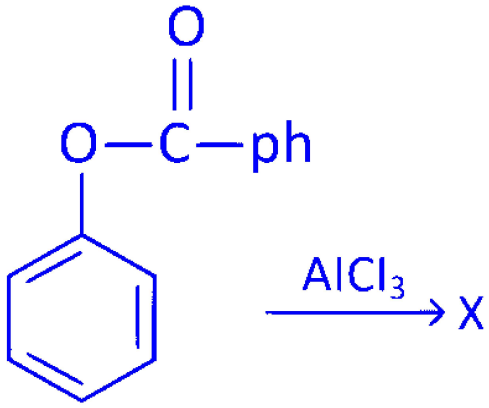
Solution:

The complete reaction sequence is as follows.



Question9

The functional groups present in the product ' X ' of the reaction given below are



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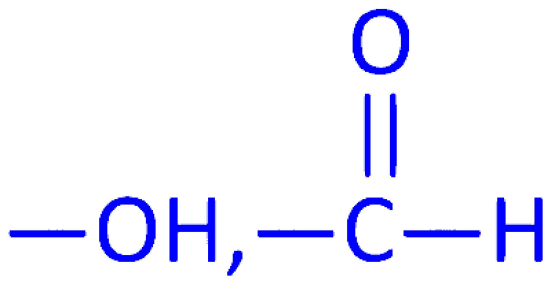
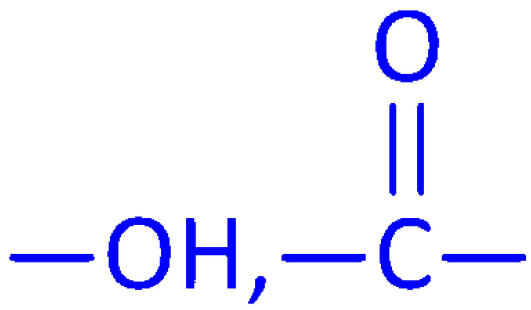
Options:

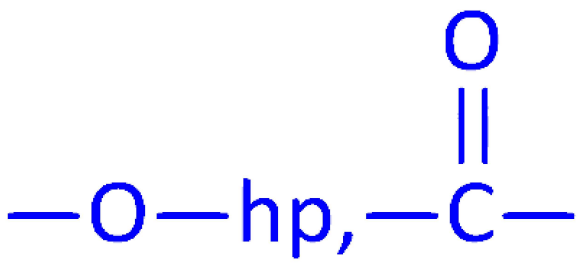
A.



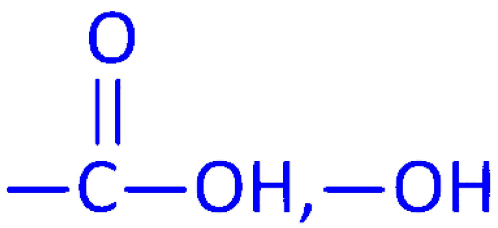
B.



C.

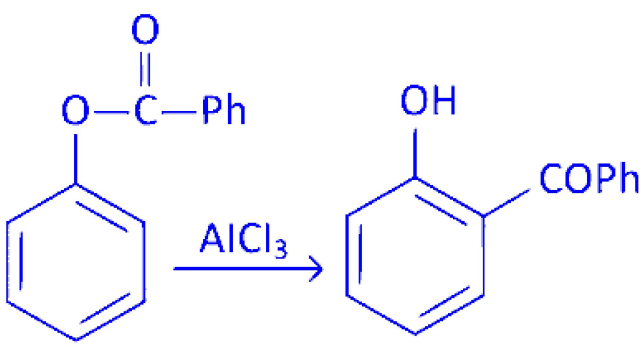


D.

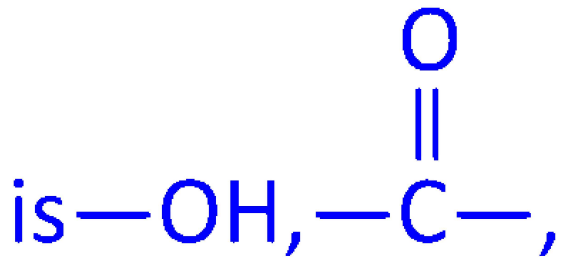


Answer: B

Solution:



So, the functional group present in ' X'



Question10

Assertion (A) : Aldehydes are more reactive than ketones towards nucleophilic addition reactions

Reason (R) : In aldehydes, carbonyl carbon is less electrophilic compared to ketones.

The correct answer is

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Options:

A. (A) and (R) are correct (R) is the correct explanation of (A).

B. (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. (A) is correct but (R) is not correct.

D. (A) is not correct but (R) is correct.

Answer: C

Solution:

A is correct, but R is not correct. The correct form of R is: Ketones are less electrophilic than aldehyde.

The positive inductive effect of second alkyl radical reinforces that of the firsy one decreasing still further the partial positive charge on carbonyl carbon atom. This reduce the attraction of aton for nucleophilic reagents. Hence, ketones are less electrophilic.

Question11

What is the major product Z in the given reaction sequence?

$$(CH_3)_2C=O \xrightarrow[(ii)\ 2H_2O^+]{(i)C_2H_5MgBr} \xrightarrow[\Delta]{(i)\ OOCl_2 \quad (ii)\ CH_3ONa} Y \xrightarrow[\text{Peroxide}]{HBr} Z$$

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Options:

A. 1-bromo-2-methylpropene

B. 2-methoxy -2-methylbutane

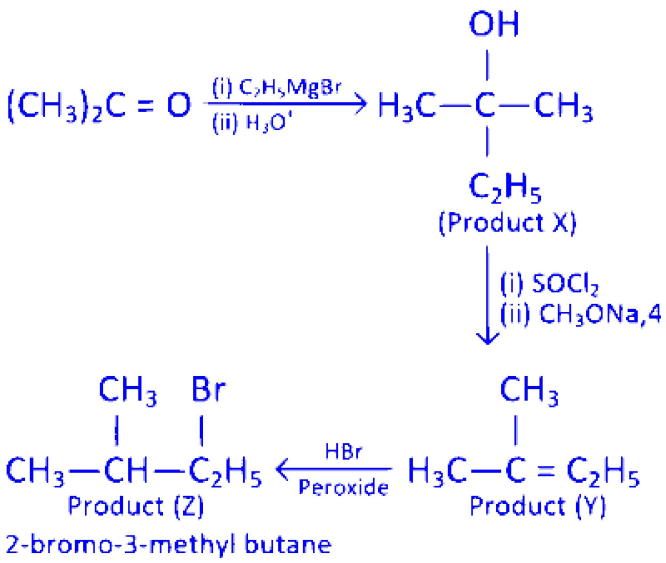
C. 2-bromo-3-methylbutane

D. 1-bromo-2-methylbutane

Answer: C

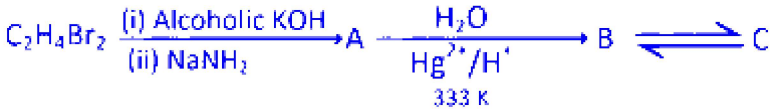
Solution:

The complete reaction is as folloms



Question12

What is the major product ' C ' in the following sequence of reactions?



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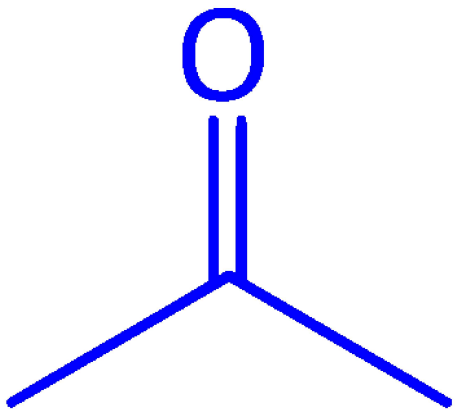
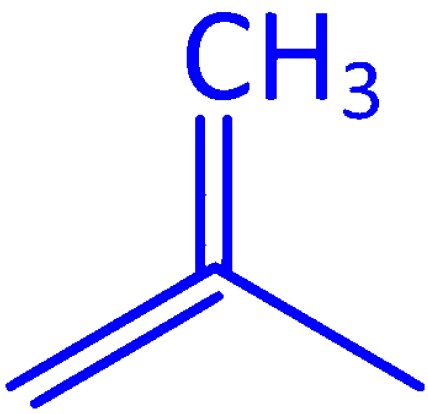
Options:

A.

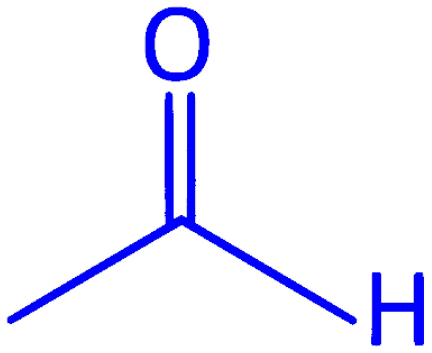
B.



C.



D.

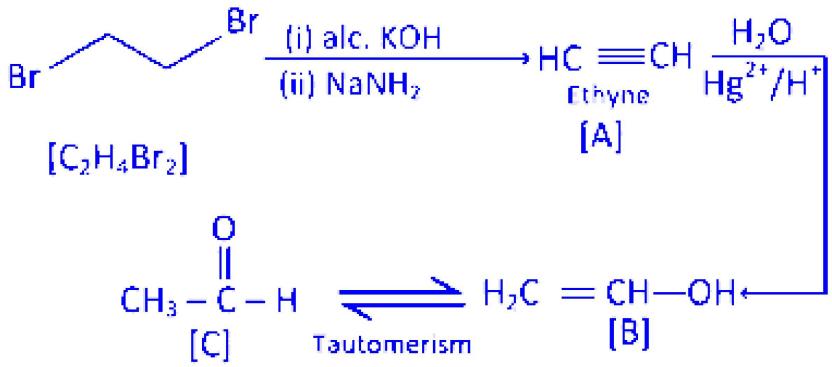


Answer: D

Solution:

1, 2-dibromoethane reacts with alcoholic KOH followed by $NaNH_2$ to give ethyne as product A.

A undergoes hydration in presence of $Hg^{2+}/H^{+}$to give unsaturated alcohol $'B.'$ B' undergoes tautomerism to form $'$ C as major product.



Question13

Which of the following represents Gatterman-Koch reaction?

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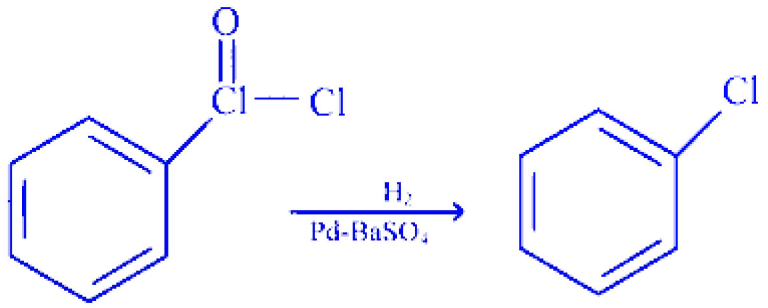
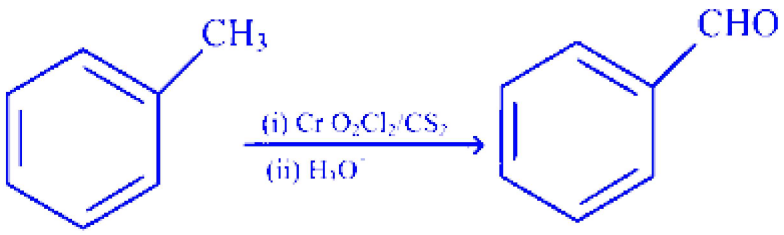
Options:

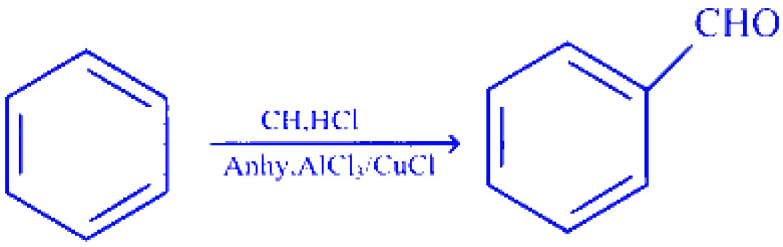
A.



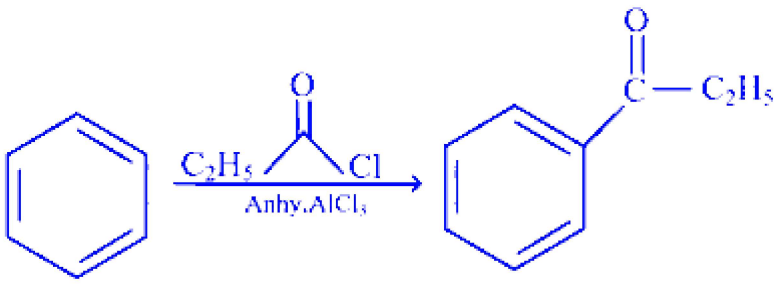
B.



C.



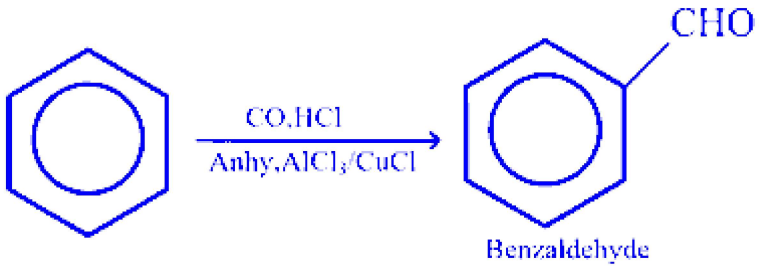
D.



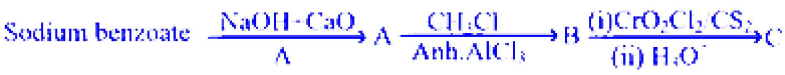
Answer: C

Solution:

In Gattermann-Koch reaction, benzene is treated with carbon monoxide (CO) in acidic medium in presence of anhy. $AlCl_3$ to give benzaldehyde.



Question14



In the reaction sequence, conversion of B to C is known as

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Options:

A. Stephen's reaction

B. Rosenmund reduction

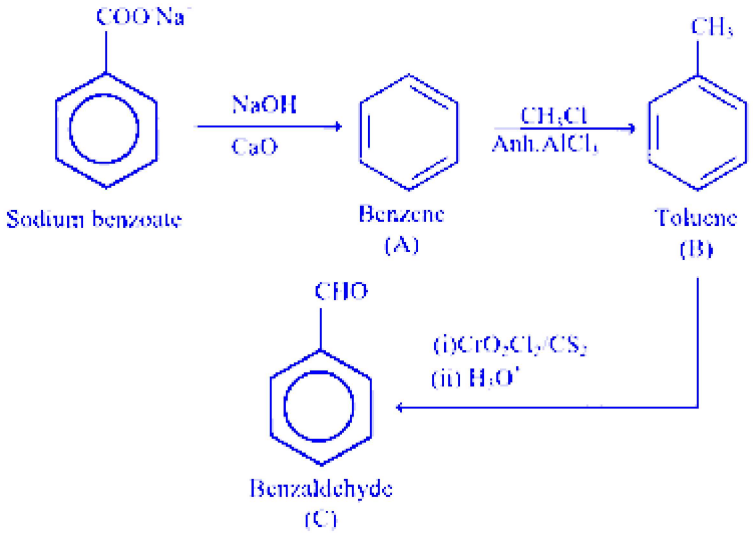
C. Etard reaction

D. Gatterman reaction

Answer: C

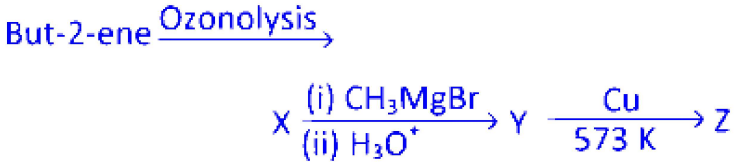
Solution:

Sodium benzoate is heated with mixture of sodium hydroxide (NaOH) and CaO to give benzene (A). A undergoes Friedel-Crafts alkylation reaction to give toluene (B). B undergoes oxidation with chromyl chloride (CrO_2Cl_2) in CS_2 to give benzaldehyde (C). This conversion of (B) to (C) is known as Etard's reaction.



Question15

Consider the following reaction sequence



The correct statements about Z areI. It gives yellow precipitate with I_2 and NaOH solution.II. It undergoes disproportionation reaction in the presence of concentrated NaOH solution.III. It undergoes Wolff-Kishner reduction.IV, If forms red precipitate with Fehling's reagent.

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Options:

A. I and II only

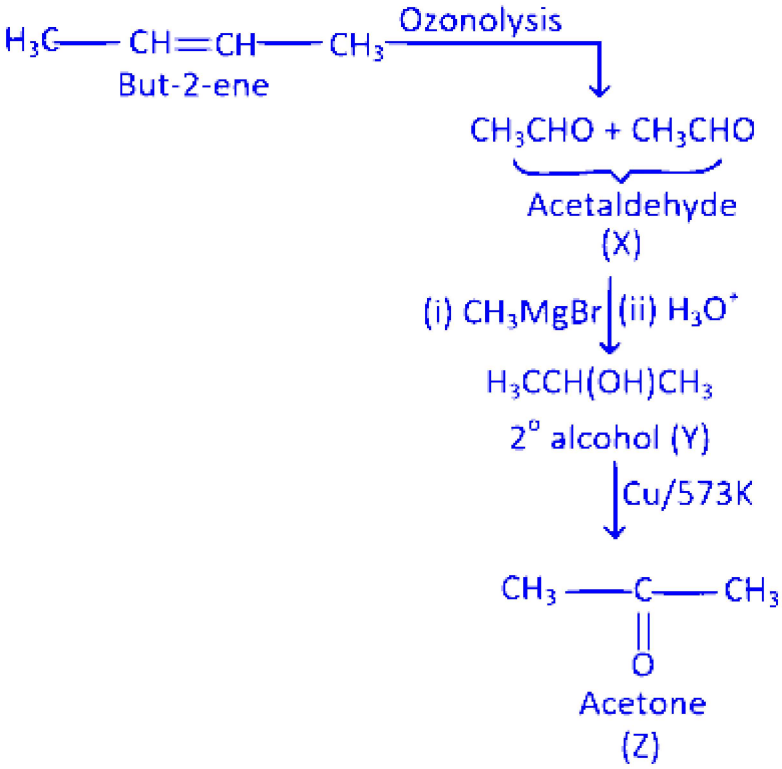
B. II and III only

C. I and IV only

D. I and III only

Answer: D

Solution:

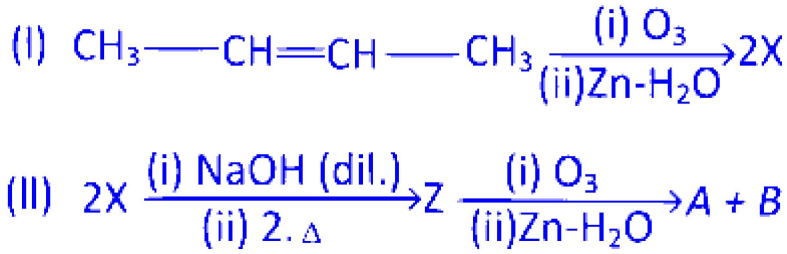


The compound (Z) formed undergoes Wolff-Kishner reduction and it also with yellow precipitate with I_2 and NaOH solution.

Thus, statements given in I and III correct.

Question16

Identify A and B from the following reactions



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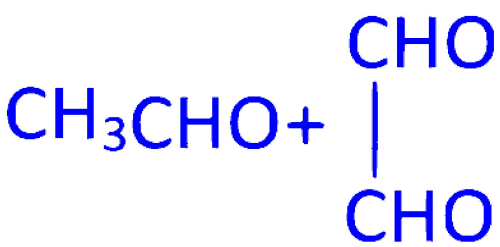
Options:

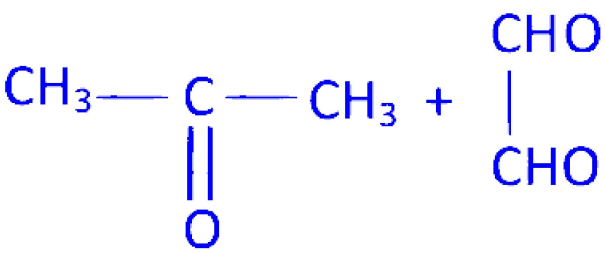
A.

B.



C.

D.



Answer: B

Solution: