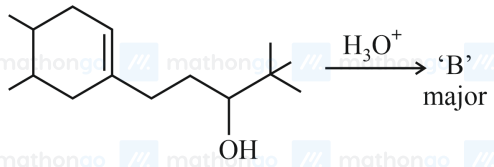
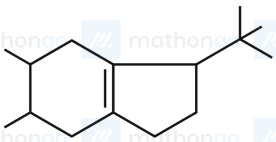
1. In the following reaction, 'B' is

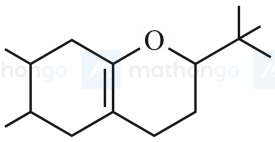


[2023 (06 Apr Shift 2)]

(1)



(2)



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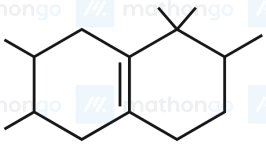

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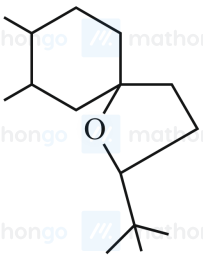
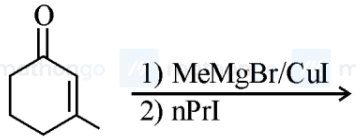
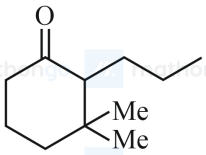
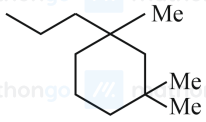


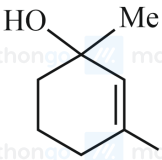
2. Find out the major product from the following reaction.

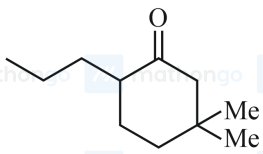


[2023 (06 Apr Shift 2)]

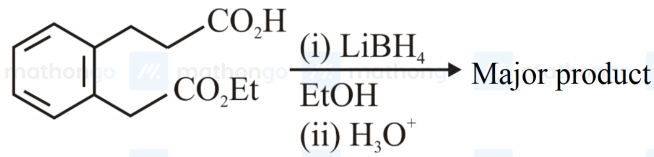
(1) 

(2) 

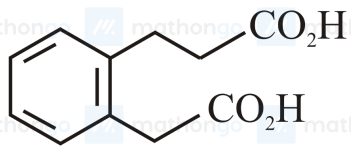
(3) 

(4) 

3. The major product formed in the following reaction is



[2023 (08 Apr Shift 1)]

(1)


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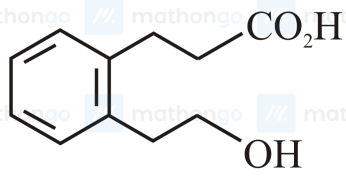
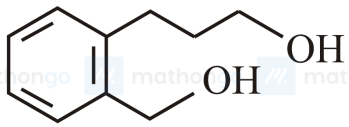


(3)


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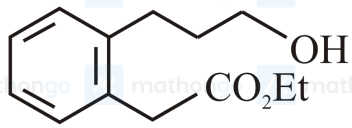


4. A compound 'X' when treated with phthalic anhydride in presence of concentrated H_2SO_4 yields 'Y'. 'Y' is used as an acid/base indicator. 'X' and 'Y' are respectively

[2023 (08 Apr Shift 2)]

(1) Anisole, methyl orange
(2) Salicylaldehyde, Phenolphthalein
(3) Toludine, Phenolphthalein
(4) Carbolic acid, Phenolphthalein

5. Suitable reaction condition for preparation of Methyl phenyl ether is

[2023 (10 Apr Shift 1)]

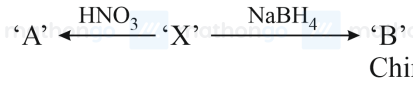
(1) $PhO^{\ominus}Na^{\oplus}$, MeOH
(2) Benzene, MeBr
(3) Ph – Br, $MeO^{\ominus}Na^{\oplus}$
(4) $PhO^{\ominus}Na^{\oplus}$, MeBr

6. Incorrect method of preparation for alcohols from the following is:

[2023 (10 Apr Shift 2)]

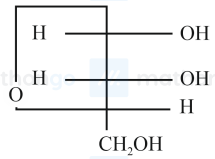
(1) Reaction of Ketone with RMgBr followed by hydrolysis.
(2) Reaction of alkyl halide with aqueous NaOH.
(3) Hydroboration-oxidation of alkene.
(4) Ozonolysis of alkene

7. L-isomer of tetrose $X(C_4H_8O_4)$ gives positive Schiff's test and has two chiral carbons. On acetylation 'X' yields triacetate. 'X' also undergoes following reactions.

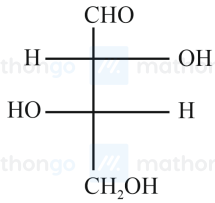


[2023 (11 Apr Shift 1)]

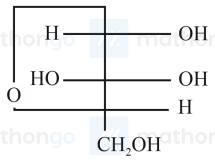
(1)



(2)



(3)



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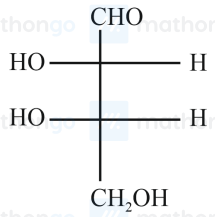
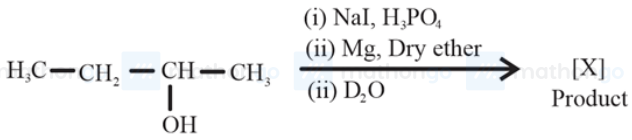


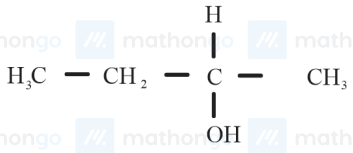
8.



Product [X] formed in the above reaction is:

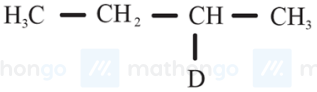
[2023 (11 Apr Shift 2)]

(1)



(2)

(3)

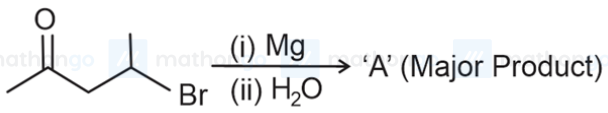


(4)

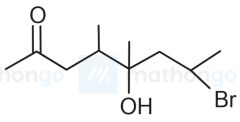
9. Number of compounds from the following which will not produce orange red precipitate with Benedict solution is.....
Glucose, maltose, sucrose, ribose,2-deoxyribose, amylose, lactose

[2023 (11 Apr Shift 2)]

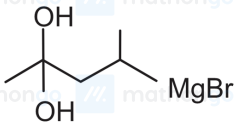
10. In the following reaction

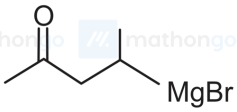


[2023 (12 Apr Shift 1)]

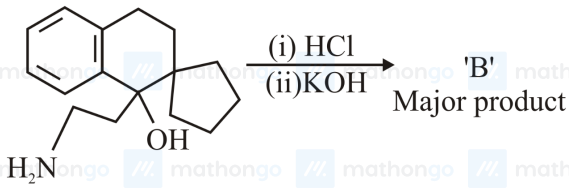
(1) 

(2) 

(3) 

(4) 

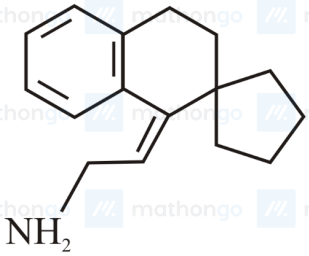
11. In the reaction given below



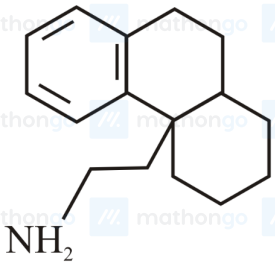
'B' is:

[2023 (13 Apr Shift 1)]

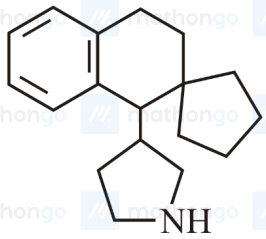
(1)



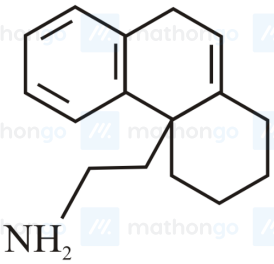
(2)



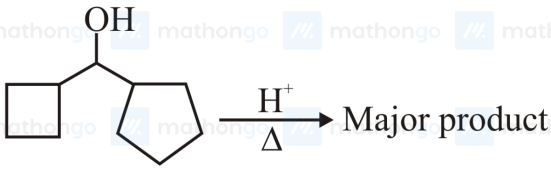
(3)



(4)



12.

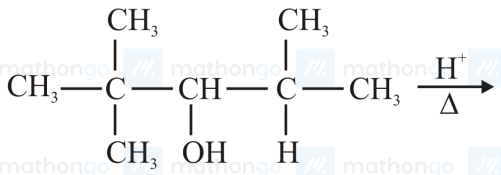


In the above reaction, left hand side and right hand side rings are named as 'A' and 'B' respectively. They undergo ring expansion. The correct statement for this process is:

[2023 (13 Apr Shift 1)]

(1) Ring expansion can go upto seven membered rings
(2) Finally both rings will become six membered each.
(3) Finally both rings will become five membered each.
(4) Only A will become 6 membered.

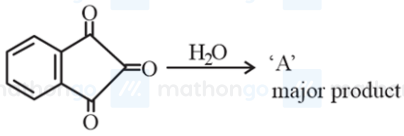
13. For the given reaction



The, total number of possible products formed by tertiary carbocation of A is_____.

[2023 (13 Apr Shift 1)]

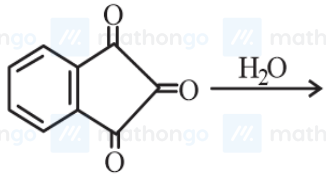
14.



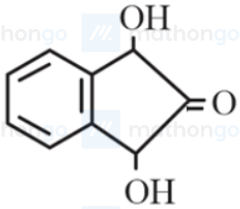
'A' formed in the above reaction is

[2023 (15 Apr Shift 1)]

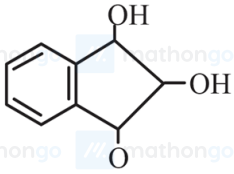
(1)



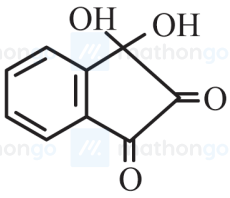
(2)



(3)



(4)

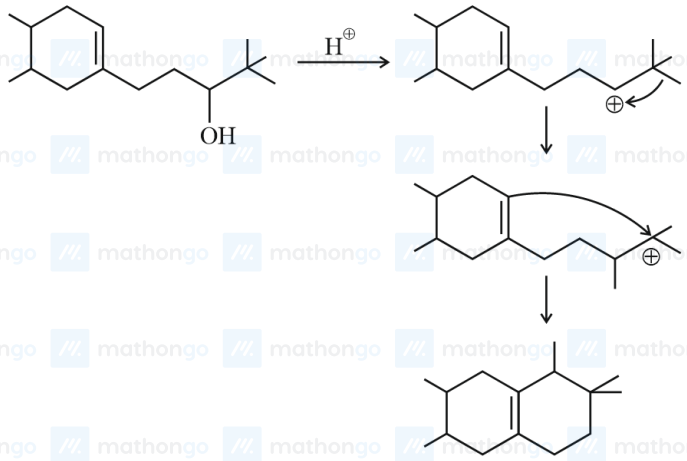


ANSWER KEYS

1. (3)	**2.** (1)	**3.** (2)	**4.** (4)	**5.** (4)	**6.** (4)	**7.** (2)	**8.** (3)
9. (2)	**10.** (2)	**11.** (4)	**12.** (2)	**13.** (5)	**14.** (1)		

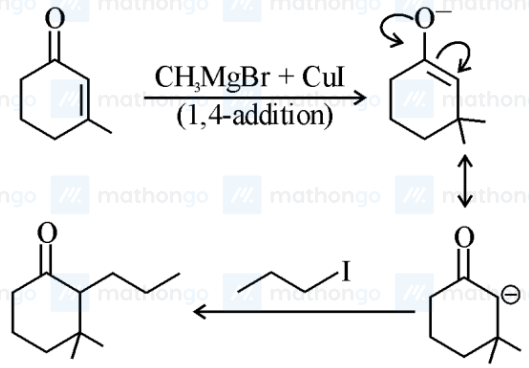
1. (3)

The given reaction is an example of dehydration of alcohol. In this reaction the first step is protonation of alcohol which leads to the formation of carbocation. The carbocation formed undergo rearrangement to get stability. The tertiary carbocation formed in this reaction involved in ring closure, which loses proton to from alkene. The steps are shown below.



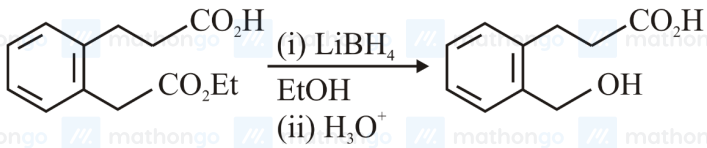
2. (1)

$\alpha, \beta-$unsaturated carbonyl compounds undergo 1,4-addition reaction with Grignard reagent in the presence of cuprous iodide. Now the carbanion formed undergo nucleophilic substitution reaction with propyl iodide as shown below.



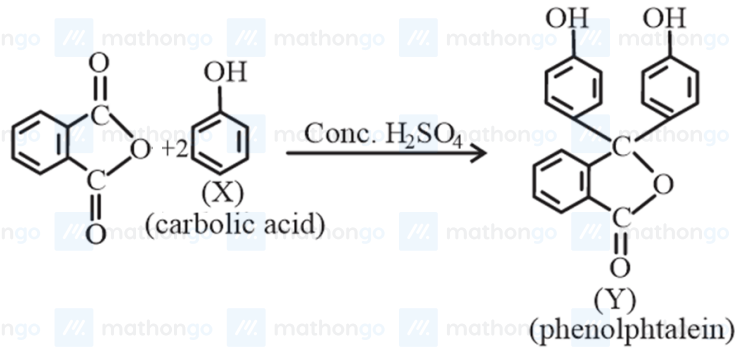
3. (2)

Lithium borohydride is commonly used for the selective reduction of esters and lactones to the corresponding alcohols in the presence of carboxylic acids, tertiary amides, and nitriles.



4. (4)

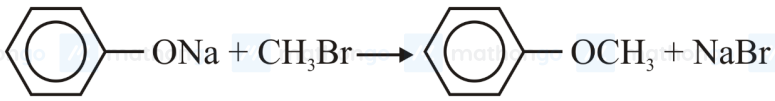
Carbolic acid or phenol reacts with phthalic anhydride in presence of conc. H_2SO_4 to form phenolphthalein which is used as an acid base indicator. The type of reaction involved is electrophilic substitution reaction. Phenol is ortho-para directing group. Hence, substitution occurs at para position.



The phenolphthalein is colourless below pH 8.5 and attains a pink to deep red hue above pH 9.0.

5. (4)

The given methyl phenyl ether can be prepared from Williamson Ether Synthesis. Williamson Ether Synthesis usually takes place as an S_N2 reaction of a Alkyl halide with an alkoxide ion. Aryl halides cannot be used in this reaction. The reaction is given below.



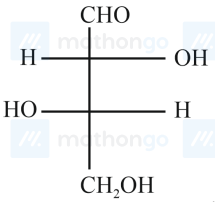
6. (4)

Reacting a Grignard reagent with a ketone gives a tertiary alcohol. When alkyl halide reacts with aqueous sodium hydroxide to give alcohol, the reaction is called nucleophilic substitution. The Hydroboration Oxidation reaction is an organic chemical reaction which is employed for the conversion of alkenes into alcohols that are neutral. Reductive ozonolysis of alkenes will lead to formation of aldehyde or ketones, oxidative ozonolysis of alkenes will lead to formation of carboxylic acids or ketones.

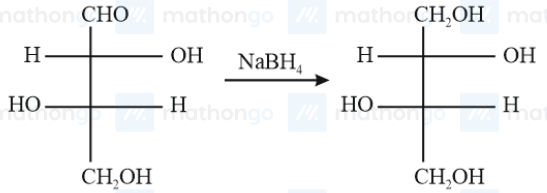
So, alcohol is not formed by ozonolysis of alkenes.

7. (2)

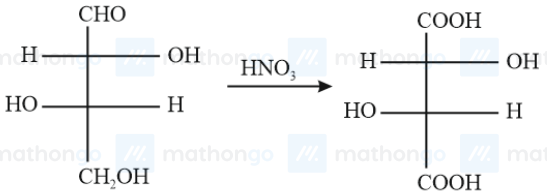
The tetrose is giving Schiff's test means it has aldehyde group. The compound X on reduction with $NaBH_4$ give Chiral compound so compound can be



identified as . The compound can give triacetate on acetylation.



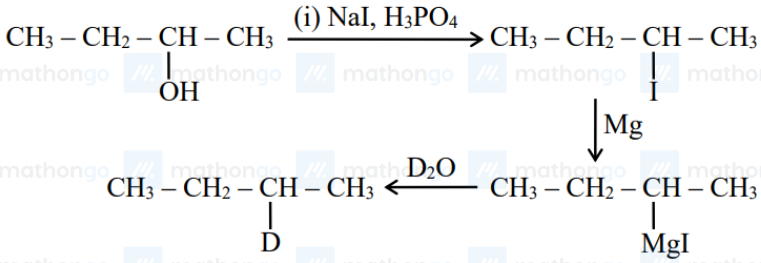
(Chiral compound)



(Chiral compound)

8. (3)

The alcohol is reacted with a mixture of sodium iodide and concentrated phosphoric acid, H_3PO_4, and the iodoalkane is distilled off. The 2-iodobutane formed in the previous reaction give Grignard reagent with magnesium metal in dry ether. The Grignard reagent formed reacts with D_2O to give 2-deuterobutane.



9. (2)

Except sucrose and amylose all others, give orange red precipitate with Benedict solution.

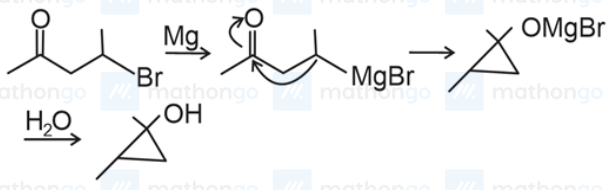
Sucrose is a non-reducing disaccharide composed of glucose and fructose. It does not have a free aldehyde or ketone group and, therefore, cannot undergo oxidation and reduce the Benedict's reagent. As a result, sucrose will not produce an orange-red precipitate with the Benedict's solution.

Amylose is a polysaccharide composed of multiple glucose units linked together. While glucose, a monosaccharide, is a reducing sugar, the glycosidic bonds in amylose prevent the free aldehyde or ketone group from being available for oxidation. As a result, amylose, as a part of starch, does not give a positive Benedict's test and will not produce an orange-red precipitate.

10. (2)

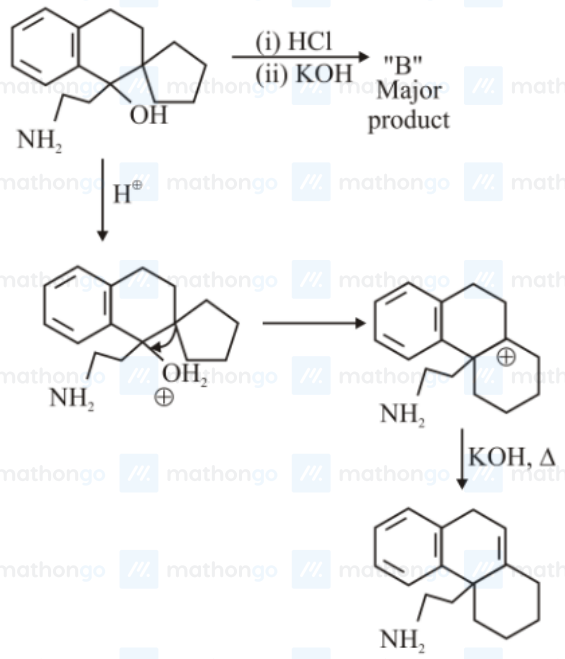
Aldehydes and ketones can react with Grignard reagents to form alcohols. Grignard reagents are organometallic compounds containing a carbon-magnesium bond (R-Mg-X).

The reaction between ketone and a Grignard reagent involves the nucleophilic addition of the carbon atom of the Grignard reagent to the carbon-oxygen double bond of the ketone. This leads to the formation of a metal alkoxide intermediate. Subsequently, the metal alkoxide reacts with water (or a protic solvent) to yield the alcohol.



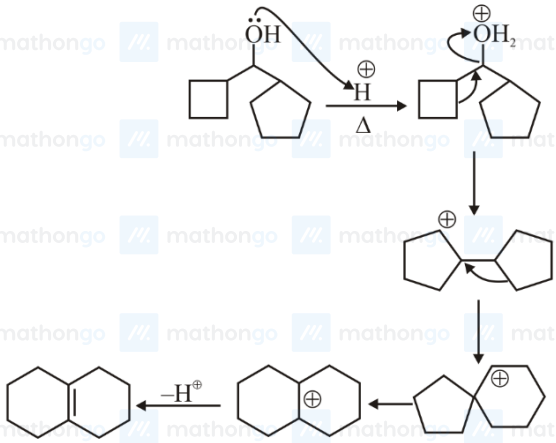
11. (4)

In the first step protonation of alcohol takes place which leads to the formation of carbocation. Ring expansion takes place in the next step. In the given process five membered ring become six membered ring. Now, the carbocation loses proton in the presence of potassium hydroxide to give alkene.



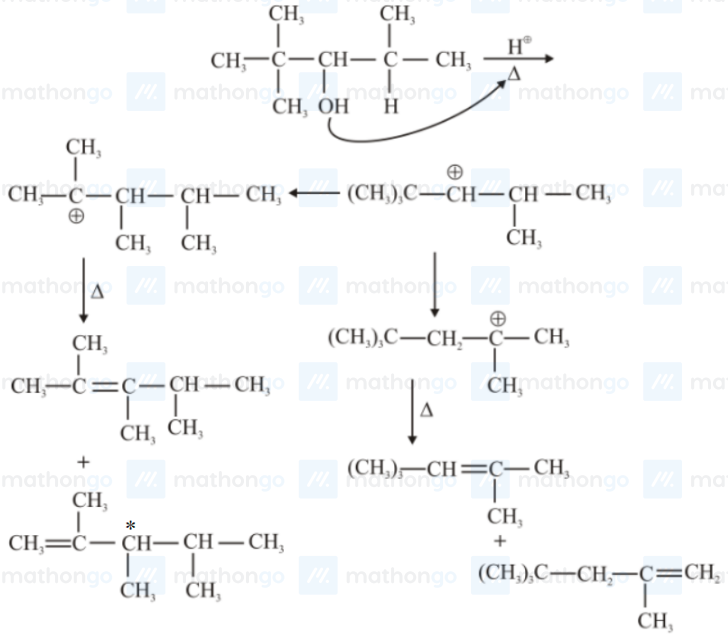
12. (2)

The reaction proceeds through a carbocation intermediate. The carbocation formed undergo rearrangement by ring expansion. Four membered ring undergo ring expansion to five membered ring and five membered ring undergo ring expansion to six membered ring and finally it converts to alkene by losing proton.



13. (5)

There are two tertiary carbocations possible due to rearrangement of hydride or methyl groups. Totally four structural alkene products are formed, out of which one is having chiral centre. Hence, total number of products formed through the formation of carbocation intermediate are 5.



(Total 5 products are possible through 3° carbocation)

14. (1)

Aldehydes and ketones react with water to give 1,1-geminal diols known as hydrates. In general, hydrates are not stable enough to be isolated as the equilibrium shifts back to starting materials (due to Le Chatelier's principle). But the following ketone forms stable diol due to the formation hydrogen bonding as shown below.