Preparatory chemistry course

Organic Chemistry

Day 2

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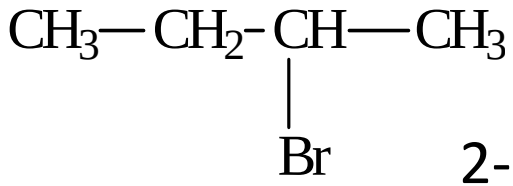
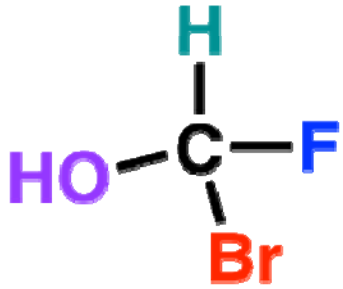
26 May 2020

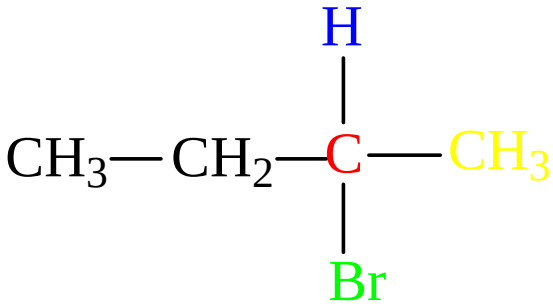
(39). Which of these compounds contain an asymmetric (chiral) carbon atom?

Correct answer (D) 

2-bromobutane

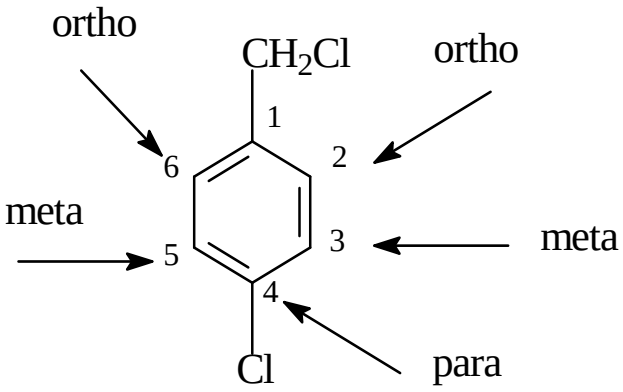


An asymmetric carbon atom is defined as a carbon within an organic compound that contains four different atoms or groups of atoms (substituents) bonded to it. As an example consider a carbon atom that is bonded to an -OH group, a hydrogen, a fluorine, and a bromine.

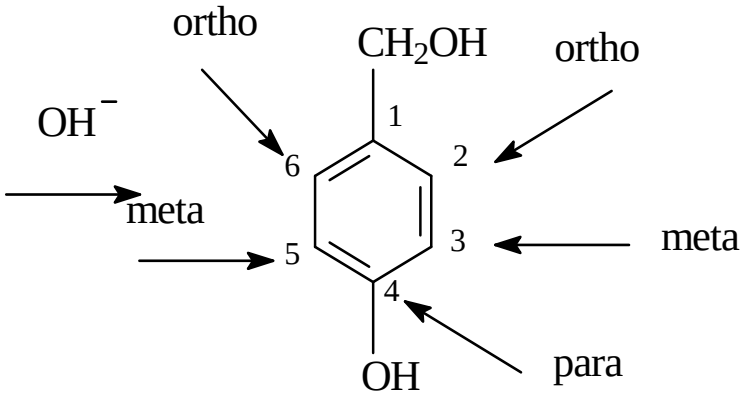


(42). The hydrolysis of 4-chlorobenzyl chloride with concentrated solution of hydroxide results in:

Correct answer (D)



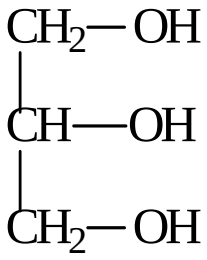
4 – Clorobenzyl chloride



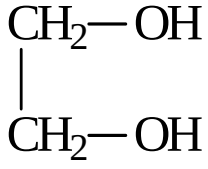
p – hydroxybenzyl alcohol

(45). Which of the listed hydroxy derivatives changes the litmus color in red?

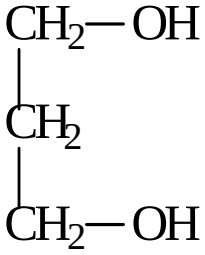
Correct answer (D)

(A) 

glycerol

(B) 

glycol

(C) 

1,3 – propanediol

Alcohol, any of a class of organic compounds characterized by one or more hydroxyl (−OH) groups attached to a carbon atom of an alkyl group (hydrocarbon chain). (A), (B) and (C) are polyhydric alcohols.

The alcohols are weaker acids than water.

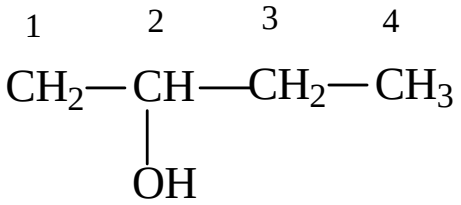
The litmus turns red in acidic solutions and blue in alkaline solutions and is the oldest and most commonly used indicator of whether a substance is an acid or a base.

Acids

Alkalis

(48). Which is the compound $C_4H_{10}O$, which forms a ketone and interact with potassium:

Correct answer (D) 2-butanol

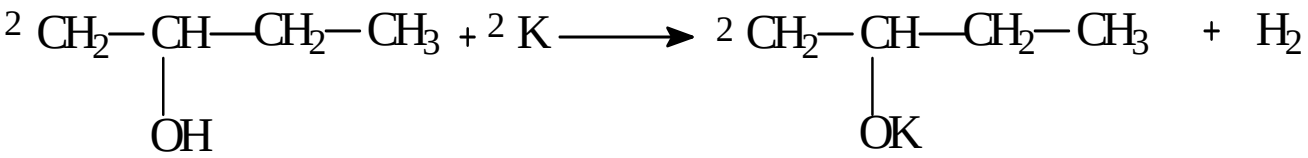


Alcohols are only slightly weaker than acid. Reaction of alcohol with potassium metal (base) results in the production of potassium alcoholate and hydrogen gas.

1-butanol (C) and 2-butanol (D) are alcohols.

butanal (A) – aldehyde.

2-butene (B) – alkene.

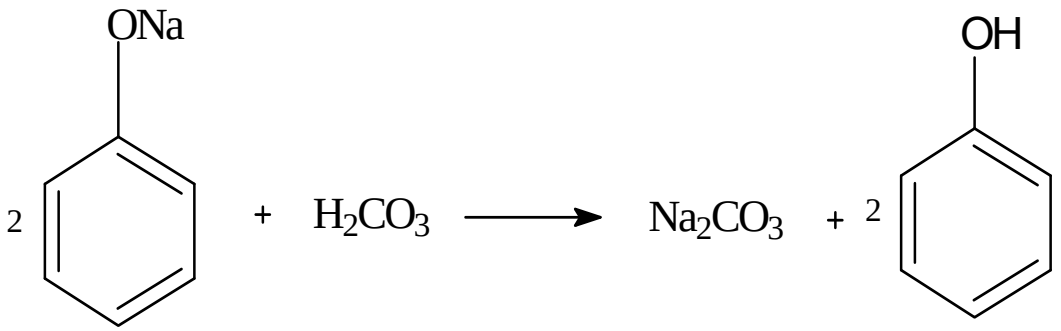


2-Butanol is a **secondary school.**

Primary alcohols (1-butanol) can be oxidized either to aldehydes or to carboxylic acids, while the oxidation of secondary alcohols (2-butanol) normally terminates at the ketone stage.

(49). The fact that phenol is weaker acid than carbonic acid is proven by interaction of:

Correct answer (B)



Carbonic acid is an inorganic weak acid, which exists only as a solution.

$$CO_2 + H_2O \rightleftharpoons H_2CO_3$$

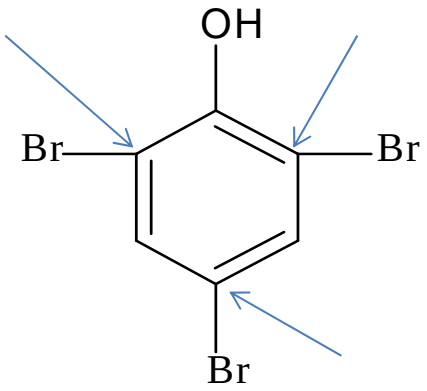
Phenols are not as acidic as carboxylic acids, but they are much more acidic than aliphatic alcohols, and they are more acidic than water.

Carbonic acid is stronger acid than **phenol** because resonating structure of bicarbonate(carbonic acid on adding H2O give bicarbonate) are equivalent
Bicarbonate is relatively more stable than phenoxide ion due to equivalent resonating structure, and we know that if bicarbonate is more stable than obviously it is more acidic.

There are many acids, and each one has its own 'strength'. sulphuric acid is a stronger acid than ethanoic acid. If you have ethanoic acid reaction with NaOH, you will get the salt sodium ethanoate. But if you then add sulphuric acid to this salt, the weaker ethanoic acid will be displaced by the stronger sulphuric acid to give sodium sulphate and ethanoic acid back. HCl is stronger than HNO_3 which is stronger than H_2SO_4.etc HCl will be able to displace HNO_3 from a nitrate salt, but HNO_3 will not be able to displace the stronger HCl from a chloride salt. Carbonic acid will displace the weaker phenol from sodium phenolate.

(52). The final product of bromination of phenol is:

Correct answer (D)



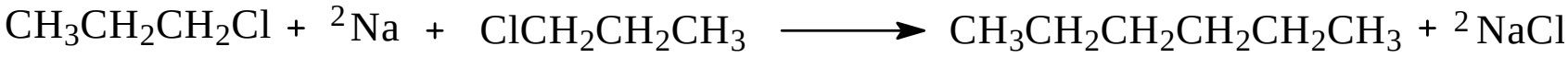
2,4,6– tribromophenol

Phenols are highly reactive towards electrophilic aromatic substitution because the nonbonding electrons on oxygen stabilize the intermediate cation. This stabilization is most effective for attack at the ortho or para position of the ring; therefore, the hydroxyl group of a phenol is considered to be activating (i.e., its presence causes the aromatic ring to be more reactive than benzene) and ortho- or para-directing.

(69). Hexane may be obtained in highest yield by Wurtz method from:

Correct answer (B)

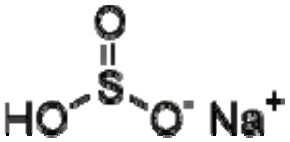
Wurtz reaction is method of preparation of higher alkanes from lower alkyl halides. This is coupling reaction. In this reaction alkyl halides are reacted with sodium metal in presence of dry ether.



1-chloropropane 1-chloropropane hexane

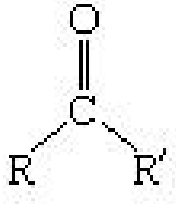
(73).Ketones do NOT interact with:

Correct answer (B) Sodium hydrogen sulfite



(Sodium bisulfite or sodium bisulphite)

Ketone, any of a class of organic compounds characterized by the presence of a carbonyl group in which the carbon atom is covalently bonded to an oxygen atom. The remaining two bonds are to other carbon atoms or hydrocarbon radicals (R):



Typical reactions of ketones include oxidation-reduction and nucleophilic addition (H_2, (A), HCN (C) and NH_3(D).

(75). The amino acids do NOT interact with:

Correct answer (D)

Amino acids contain two functional groups : amines and carboxylic acids.

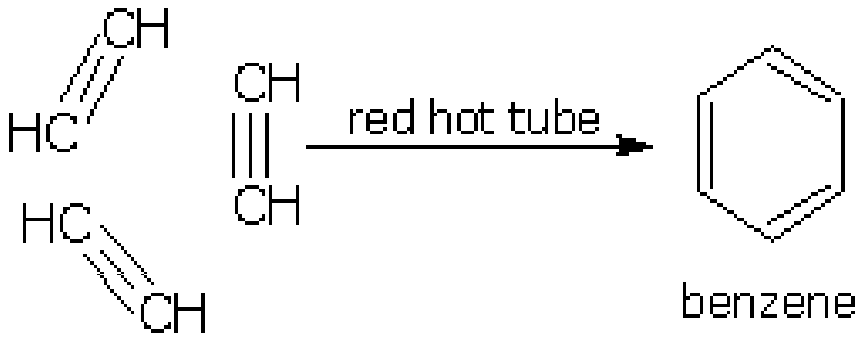
So amino acids undergo the reactions characteristic of those functional groups.

For example – glycine NH_2CH_2COOH

(80). Benzene may be obtained synthetically through:

Correct answer (C)

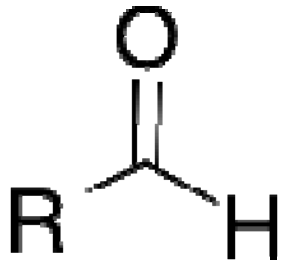
When ethylene (acetylene) is passed through a red hot copper tube, it polymerises (trimerization) to benzene.

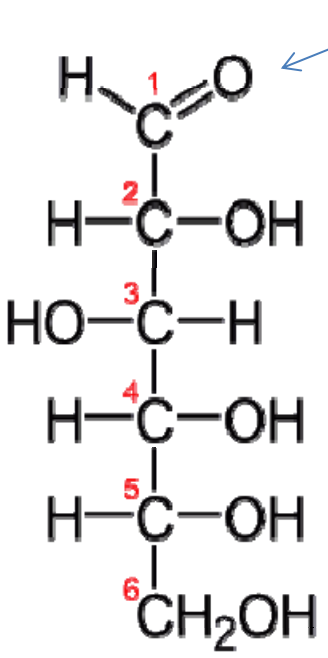


(89). Which of the following compounds contains an aldehyde group:

Correct answer (D)

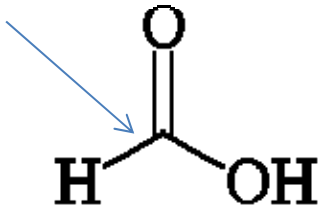
Aldehyde, any of a class of organic compounds, in which a carbon atom shares a double bond with an oxygen atom, a single bond with a hydrogen atom, and a single bond with another atom or group of atoms (designated R in general chemical formulas and structure diagrams). The double bond between carbon and oxygen is characteristic of all aldehydes and is known as the carbonyl group.



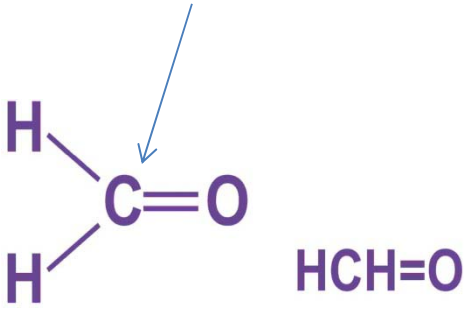


Glucose (A)

Aldehyde group



Methanoic acid (formic acid) is not a typical carboxylic acid; it is distinguished by its acid strength, its failure to form an anhydride, and its reactivity as a reducing agent—a property due to the –CHO group, which imparts some of the character of an aldehyde. (B)

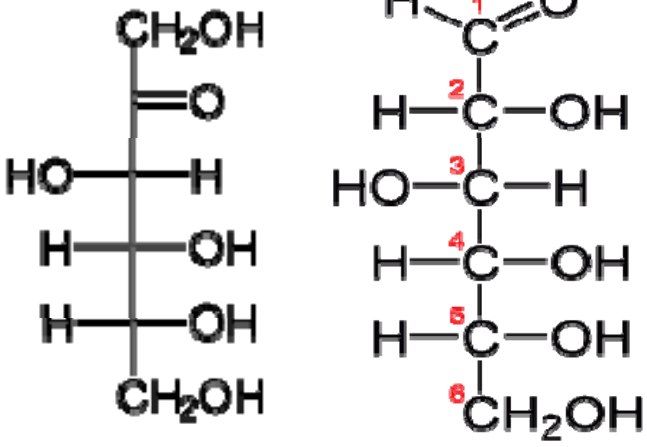


Methanal (formaldehyde) (C)

(96). Which of the listed compounds is NOT monosaccharide?

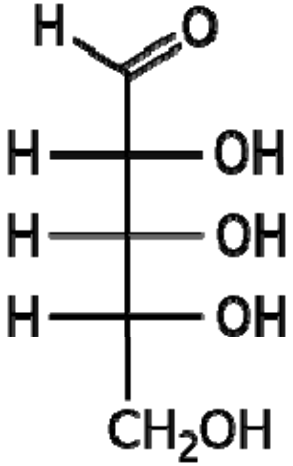
Correct answer (D)

Monosaccharide, a sugar that is not decomposable into simpler sugars by hydrolysis, is classed as either an aldose or ketose, and contains one or more hydroxyl groups per molecule — called also simple sugar.

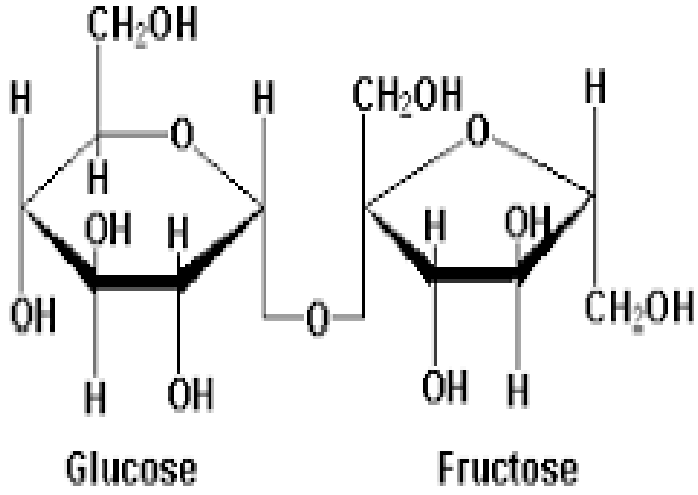


Fructose (A)

Glucose (B)



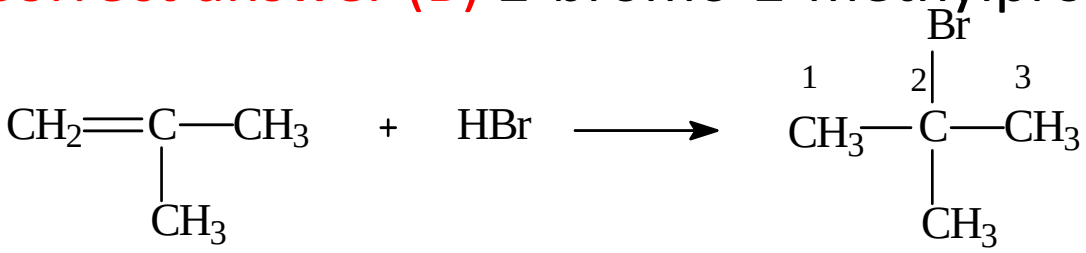
Ribose (C)



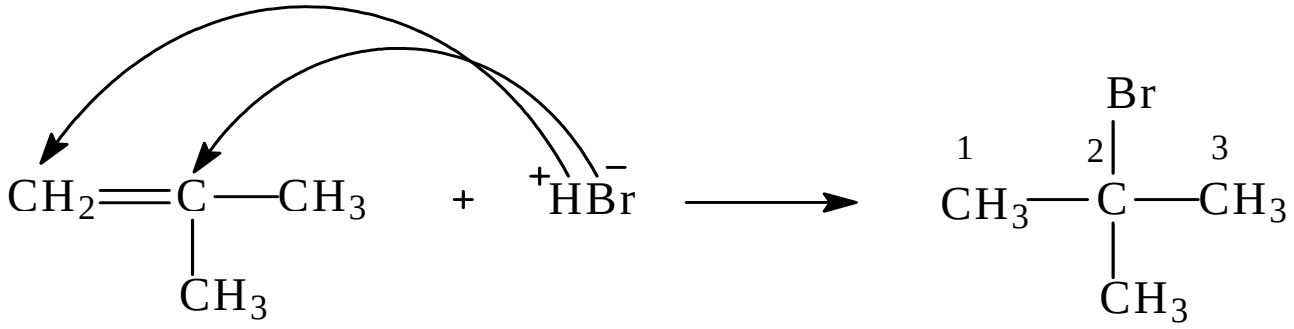
Saccharose

(99). The product of interaction between methylpropene and HBr is:

Correct answer (B) 2-bromo-2-methylpropane

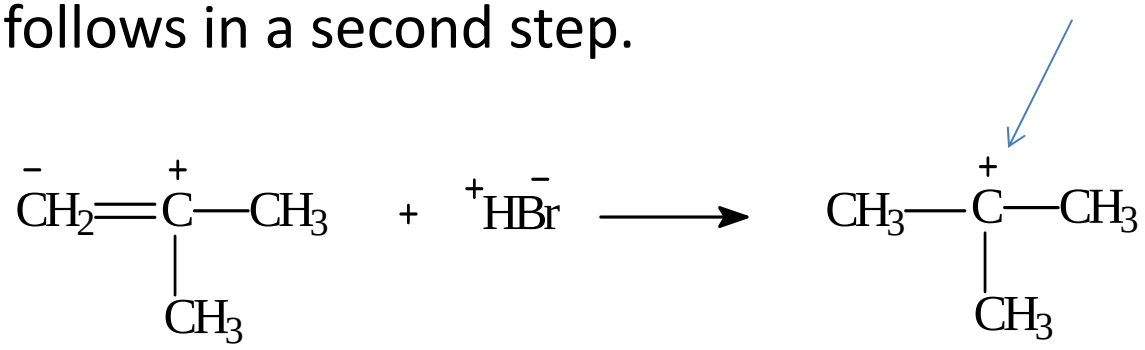


Definition of Markovnikov rule: a statement in chemistry: in the addition of compounds to olefins the negative portion of the compound added (as the bromine in hydrogen bromide) becomes attached to the least hydrogenated end of the carbon-carbon double bond.



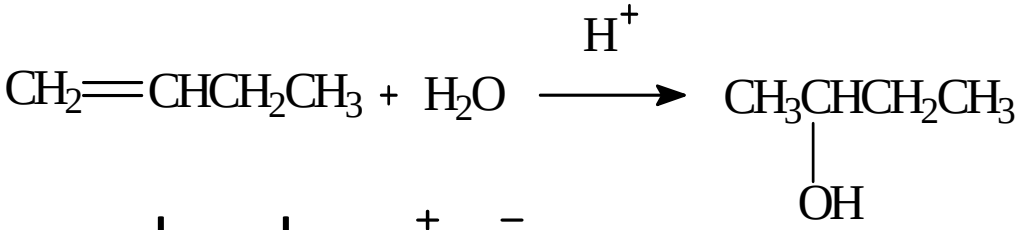
Markovnikov discovered that in the hydrohalogenation reaction with an asymmetric alkene, the halogen preferred the more substituted carbon atom.

The proton adds first to the carbon-carbon double bond. The carbon bearing more substituents forms a more stable carbenium ion; attack of bromide ion follows in a second step.



(100). Choose the product of addition of water to 1-butene:

Correct answer (C)



Water is a polar molecule - $\overset{+}{H}OH^{-}$.

This addition of water is according to Markovnikov rule.

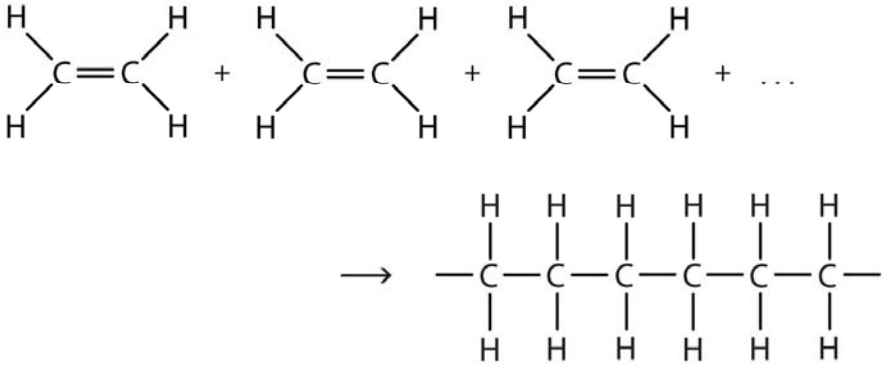
$$n CH_2=CH_2 \rightarrow [CH_2CH_2]_n$$

(101). Polymerization is characteristic for:

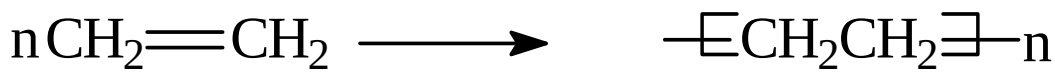
Correct answer (A)

Polymerization is a chemical reaction in which two or more molecules combine to form larger molecules that contain repeating structural units.

There are two general types of polymerization reactions: addition polymerization and condensation polymerization. In addition polymerization, the monomers add to one another in such a way that the polymer contains all the atoms of the starting monomers. Ethylene molecules are joined together in long chains.



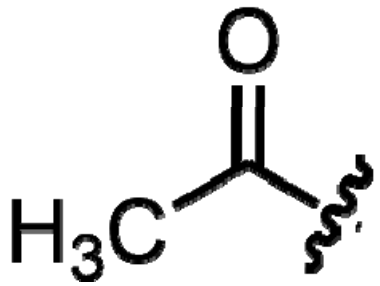
The polymerization is often abbreviated as follows:



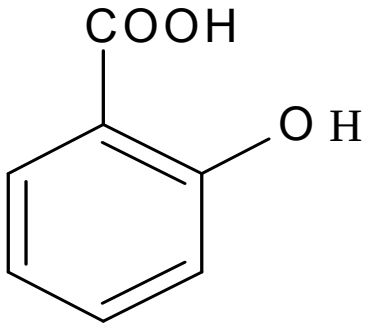
During the polymeriation of ethene, thousands of ethene molecules join together to make poly(ethene) - commonly called polythene. The reaction is done at high pressures in the presence of a trace of oxygen as an initiator.

(105). The given formula represents the structure of:

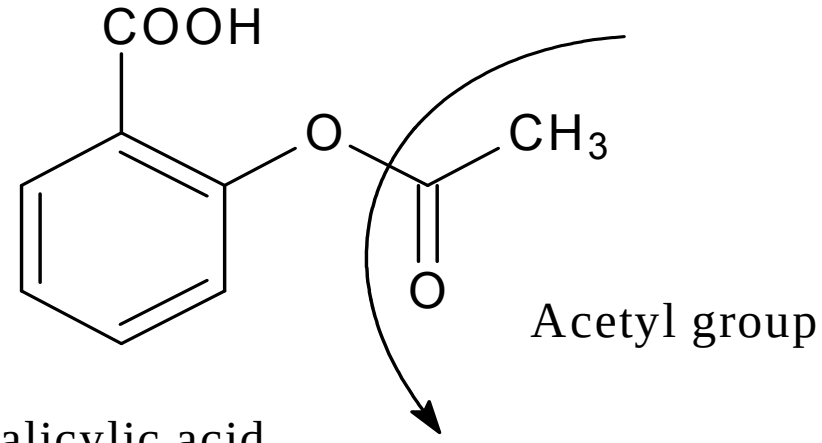
Correct answer (A) Acetylsalicylic acid



Acetyl group



Salicylic acid



Salicylic acid

Acetylsalicylic acid (Aspirin)

(110). The maltose is:

Correct answer (B) a disaccharide consisting of glucose residues, an intermediate in the hydrolysis of strch.

Maltose, a product of the breakdown of starches during digestion, consists of two molecules of glucose connected via an α-linkage.