Alkynes

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Solution 1:

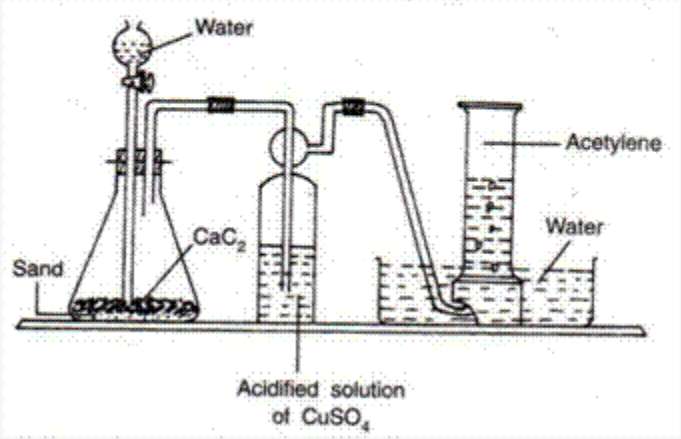
First four members of the homologus series of alkynes are:

- Ethyne
- Propyne
- Butyne
- Pentyne

Solution 2:

Ethyne is prepared by the reaction of calcium carbide with water

$$CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$$



Solution 3:

Addition Reactions: The reactions in which molecules of the attacking reagent add across the double or triple bond of an unsaturated compound to yield saturated compound.

In case of ethene the addition occurs due to presence of double bond hence one molecule of the compound is added whereas in case of alkynes there is presence of triple bond hence two molecules of the compound is added.

Solution 4:

Equations:

(i) Bromine water:

$$CH \equiv CH + Br - Br \xrightarrow{CCl_4} CHBr = CHBr$$
$$CHBr = CHBr + Br - Br \xrightarrow{CCl_4} CHBr_2 - CHBr_2$$

(ii) Excess of Hydrochloric acid:

$$CH \equiv CH \xrightarrow{HCl} CH_2 = CHCl$$
$$CH_2 = CHCl \xrightarrow{HCl} CH_3 - CHCl_2$$

Solution 5:

(i) Ethyne to ethane:

$$CH \equiv CH + H_2 \xrightarrow{Ni,300^\circ C} CH_2 = CH_2$$
$$CH_2 = CH_2 + H_2 \xrightarrow{Ni} CH_3 - CH_3$$

(ii) Ethyne to acetaldehyde:

$$CH \equiv CH + H_2O + [O] \xrightarrow[H_2SO_4]{HgSO_4} CH_3CHO$$

Solution 6:

Two chemical tests to distinguish between ethane and ethyne are:

(i) Bromine water test
(ii) Baeyers test

Solution 7:

S.No.	Saturated organic compound	Unsaturated organic compound
1.	All the four valencies of each carbon atom are satisfied by forming single covalent bonds with carbon and with hydrogen atoms	The valencies of at least two carbon atoms are not fully satisfied by the hydrogen atoms
2.	Carbon atoms are joined only by a single covalent bond	Carbon atoms are joined by double covalent bonds or by triple covalent bonds.
3.	Less reactive	More reactive

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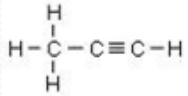
Solution 8:

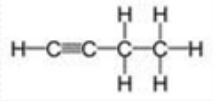
Structural formulae and IUPAC name of Second Homologues:

Propyne



Structural formulae and IUPAC name of third homologues:

Butyne



Solution 9:

(a) Hydrogen:

$$CH \equiv CH + H_2 \xrightarrow{Ni,300^\circ C} CH_2 = CH_2$$
$$CH_2 = CH_2 + H_2 \xrightarrow{Ni} CH_3 - CH_3$$

(b) Water:

$$CH \equiv CH + H_2O + [O] \xrightarrow[H_2SO_4]{HgSO_4} CH_3CHO$$

(c) Bromine:

$$CH \equiv CH + Br - Br \xrightarrow{CCl_4} CHBr = CHBr$$
$$CHBr = CHBr + Br - Br \xrightarrow{CCl_4} CHBr_2 - CHBr_2$$

Solution 10:

(i) Ethene and ethyne burns with a sooty luminous flame as all the carbon atoms do not get oxidized.

(ii) Ethane does not undergo addition reaction due to absence of double and triple bond.

(iii) Ethyne is used for welding and cutting metals as ethylene produce high temperature.

Solution 11:

Uses of ethyne:

(i) For welding and cutting metals

(ii) For artificial ripening of fruits

(iii) As a general anaesthetic under the name Naracylene.