



**Chemistry 10**  
**Chapter 12 - Hydrocarbons**  
**Exercise - Short Questions**

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1. Differentiate between saturated and unsaturated hydrocarbons.

Saturated Hydrocarbons	Unsaturated hydrocarbons
<ul style="list-style-type: none"> <li>The compounds in which all the four valences of carbon atoms are fully satisfied by single bonds with other carbon atoms and hydrogen atoms is called saturated hydrocarbons.</li> </ul>	<ul style="list-style-type: none"> <li>The compounds in which two carbon atoms are linked by a double or triple bond are called hydrocarbons.</li> </ul>
<ul style="list-style-type: none"> <li>Saturated hydrocarbons are also called alkanes.</li> </ul>	<ul style="list-style-type: none"> <li>Unsaturated hydrocarbons are also called alkenes (with double covalent bond) and alkynes (with triple covalent bond.)</li> </ul>
<ul style="list-style-type: none"> <li>Their general formula is <math>C_nH_{2n+2}</math>.</li> </ul>	<ul style="list-style-type: none"> <li>Their general formula is <math>C_nH_{2n}</math> for alkene and <math>C_nH_{2n-2}</math> for alkyne.</li> </ul>
<b>Example:</b> $CH_4$ (Methane) $H_3C-CH_3$ (Ethane)	<b>Example:</b> $H_2C=CH_2$ (Ethene) $HC\equiv CH$ (Ethyne)

2. A compound consisting of four carbon atoms has a triple bond in it. How many hydrogen atoms are present in it?

A compound consisting of four carbon atoms has a triple bond in it, contain six hydrogen.

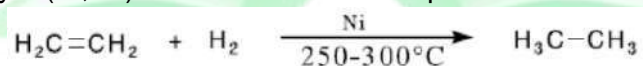
**Formula:**  $H_3C-C\equiv C-CH_3$

3. Why are the alkanes called 'paraffins'?

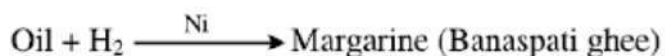
The simplest hydrocarbons are alkanes. In these compounds, all the bonds of carbon atoms are single that means valencies of carbon atoms are saturated. Therefore, they are least reactive. That is the reason, alkanes are called paraffins (para means less, and affins means affinity or reactivity).

4. What do you know about hydrogenation of alkenes?

Hydrogenation means addition of molecular hydrogen to an unsaturated hydrocarbon in the presence of a catalyst (Ni, Pt) to form saturated compound.

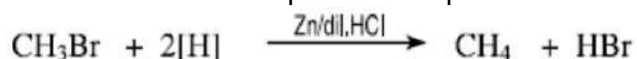


On industrial scale, this reaction is used to convert vegetable oil into margarine (Banaspoti ghee).



5. How are alkyl halides reduced?

Reduction means addition of nascent hydrogen. In fact, it is a replacement of a halogen atom with a hydrogen atom. This reaction takes place in the presence of Zn metal and HCl.



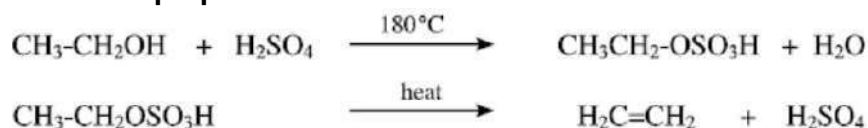
6. Why are the alkanes used as fuel?

Alkanes burn in the presence of excess of air or oxygen to produce a lot of heat, carbon dioxide and water. This reaction takes place in automobile combustion engines, domestic heaters and cooking appliances. It is highly exothermic reaction and because of it alkanes are used as fuel



**7. How can you prepare ethene from alcohol and ethyl bromide?**

From Alcohols can be prepared as follow:



From ethyl bromide can be prepared as follow:



**8. Identify propane from propene with a chemical test.**

Pass the both gases through bromine water. If the color of bromine discharges, it is propene, otherwise it is propane.

**9. Why are the alkenes called 'olefins'?**

Alkenes are also known as olefins (a Latin word meaning oil forming) because first members form oily products when react with halogens.

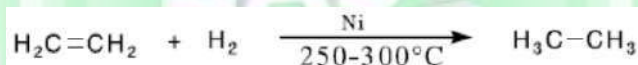
**10. Why alkane can't be oxidized with KMnO4 solution**

Alkanes are saturated hydrocarbons and they are least reactive that's why alkane can't be oxidized with KMnO4 solution.

**Alkane + KMnO4 → No reaction**

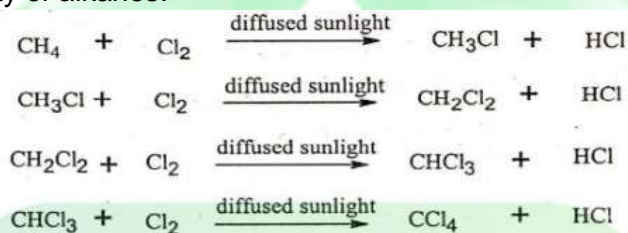
**11. What are the addition reactions? Explain with an example.**

These are the reactions in which the products are formed by the addition of some reagents like H<sub>2</sub>, Cl<sub>2</sub>, etc., to an unsaturated organic compound.



**12. Justify that alkanes give substitution reactions.**

A reaction in which one or more hydrogen atoms of a saturated compound are replaced with some other atoms (like halogen) is called a substitution reaction. These reactions are a characteristic property of alkanes.



**13. Both alkenes and alkynes are unsaturated hydrocarbons. State the one most significant difference between them.**

Alkenes	Alkynes
<ul style="list-style-type: none"> <li>The compounds in which two carbon atoms are linked by a double bond are called alkenes.</li> </ul>	<ul style="list-style-type: none"> <li>The compounds in which two carbon atoms are linked by a Triple bond are called alkenes.</li> </ul>
<ul style="list-style-type: none"> <li>Their function group is  <math>\begin{array}{c} -\text{C}=\text{C}- \\   \quad   \end{array}</math> </li> </ul>	<ul style="list-style-type: none"> <li>Their functional group is  <math>-\text{C}\equiv\text{C}-</math> </li> </ul>

**14. Write the molecular, dot and cross and structural formula of ethyne.**

Name	Molecular Formula	Structural Formula	Cross and dot Formula
Ethyne	C <sub>2</sub> H <sub>2</sub>	H-C≡C-H	H·C≡C·H

**16. Give the physical properties of alkanes.**

- i. They are nonpolar, therefore, they are insoluble in water but soluble in organic solvents.
- ii. The density of alkanes increases gradually with the increase of molecular size.
- iii. The alkanes become more viscous as their molecular sizes increase

**17. How can you identify ethane from ethene?**

Pass the both gases through bromine water. If the color of bromine discharges, it is ethene, otherwise it is ethane.

**18. Why colour of bromine water discharges on addition of ethene in it?**

When bromine water is added to ethene in an inert solvent like carbon tetrachloride, its colour is discharged at once. In the reaction, double bond of ethene is converted into a single bond by the addition of a molecule of bromine. This reaction is used to identify the unsaturation of an organic compound

**19. State one important use of each:**

**Ethene:** It is used as a general anaesthetic.

**Acetylene:** It is used for the ripening of fruits.

**Chloroform:** Chloroform is used as a solvent for rubber, waxes, etc., and for anaesthesia

**Carbon tetrachloride:** Carbon tetrachloride is used as an industrial solvent and in dry cleaning.

