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Hydrocarbon

1. Saturated Hydrocarbon
2. Unsaturated Hydrocarbon

Saturated Hydrocarbon :- The hydrocarbon which contains Single covalent bond between the carbon - carbon atom is called saturated hydrocarbon.

Some example :- Methane, Ethane, Butane etc.

Question :-

Define Alkyl group.

Ans The group of atom which is formed by removal of 1 - Hydrogen from alkane group is called Alkyl group

It's general formula is C_nH_{2n+1}

It is represented by R

Examples:

1) Methane (CH_4) $\xrightarrow{-H}$ Methyl (CH_3)
2) Ethane (C_2H_6) $\xrightarrow{-H}$ Ethyl (C_2H_5)
3) Propane (C_3H_8) $\xrightarrow{-H}$ Propyl (C_3H_7)

4) Butane (C_4H_{10}) $\xrightarrow{-H}$ Butyl (C_4H_9)
5) Pentane (C_5H_{12}) $\xrightarrow{-H}$ Pentyl (C_5H_{11})
6) Hexane (C_6H_{14}) $\xrightarrow{-H}$ Hexyl (C_6H_{13})
7) Heptane (C_7H_{16}) $\xrightarrow{-H}$ Heptyl (C_7H_{15})
8) Octane (C_8H_{18}) $\xrightarrow{-H}$ Octyl (C_8H_{17})
9) Nonane (C_9H_{20}) $\xrightarrow{-H}$ Nonyl (C_9H_{19})
10) Decane ($C_{10}H_{22}$) $\xrightarrow{-H}$ Decyl ($C_{10}H_{21}$)

Alkanes (R-H)

S.N	Prefix	Alkane
1	Meth	Methane (CH_4)
2	Eth	Ethane (C_2H_6)
3	Prop	Propane (C_3H_8)
4	But	Butane (C_4H_{10})
5	pent	Pentane (C_5H_{12})
6	hex	hexane (C_6H_{14})
7	hept	heptane (C_7H_{16})
8	oct	octane (C_8H_{18})
9	non	nonane (C_9H_{20})
10	dec	decane ($C_{10}H_{22}$)

2) Unsaturated hydrocarbon :- Those hydrocarbon which contain double or triple covalent bond between the carbon atoms is called unsaturated hydrocarbon

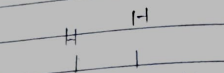
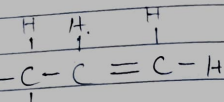
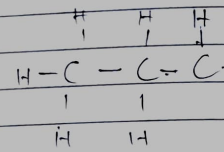
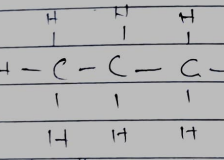
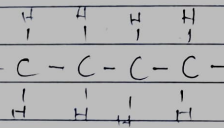
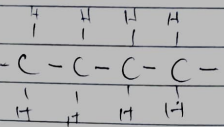
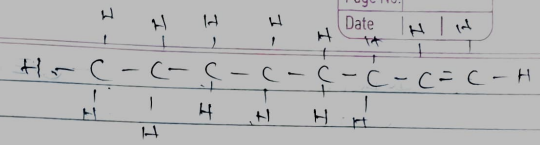
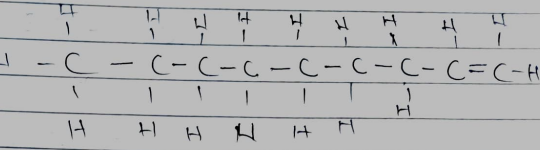
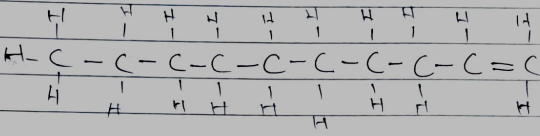
The examples of unsaturated hydrocarbon are alkenes and alkynes.

Alkene — The unsaturated ~~hydrogen~~ hydrocarbon which contain double covalent bond between the carbon atoms is called alkene.

for eg:- Ethene, propene etc.

S.N	Alkene	Condensed formula
1	Ethene	$CH_2 = CH_2$
2	Proprene	$CH_3 - CH = CH_2$
3	Butene	$CH_3 - CH_2 - CH = CH_2$
4	Pentene	$CH_3 - CH_2 - CH_2 - CH = CH_2$
5	Hexene	$CH_3 - CH_2 - CH_2 - CH_2 - CH = CH_2$
6	Heptene	$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH = CH$
7	Octene	$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH = CH_2$
8	Nonene	$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH = CH_2$
9	Decene	$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH = CH_2$

Alkene.

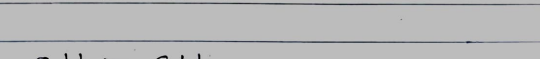
S.N	~~Alk~~ Alkene	
1)	Ethene (C_2H_4)	
2)	Propene (C_3H_6)	
3)	Butene (C_4H_8)	
4)	Pentene (C_5H_{10})	
5)	Hexene (C_6H_{12})	
6)	Heptene (C_7H_{14})	
7)	Octene (C_8H_{16})	
8)	Nonene (C_9H_{18})	
10)	Decene ($C_{10}H_{20}$)	

Alkyne – Those hydrocarbon which contains triple covalent bond between the carbon atom is called alkyne

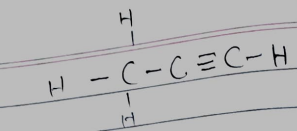
They are more reactive than alkane because they contains triple covalent due to which they can take part in chemical reaction ~~more~~ easily than alkane.

For examples:-

1) Ethyne (C_2H_2)

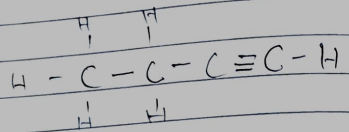


2) Propyne (C_3H_4)



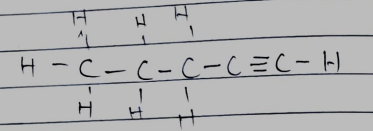
$CH_3 - C \equiv CH$

3) Butyne (C_4H_6)



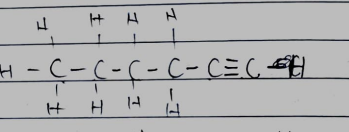
$CH_3 - CH_2 - C \equiv CH$

4) Pentyne (C_5H_8)



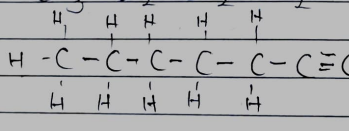
$CH_3 - CH_2 - CH_2 - C \equiv CH$

5) Hexyne (C_6H_{10})



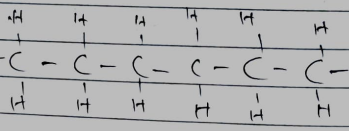
$CH_3 - CH_2 - CH_2 - CH_2 - C \equiv CH$

6) Heptyne (C_7H_{12})



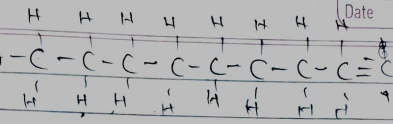
$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - C \equiv CH$

7) Octyne (C_8H_{14})



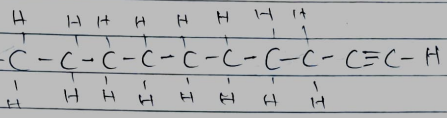
$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - C \equiv CH$

8) Nonyne (C_9H_{16})



$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - C \equiv CH$

10) Decyne ($C_{10}H_{18}$)



$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - C \equiv CH$

Note:-

IUPAC = Prefix + W.R + P.S + S.S

Prefix :- The atom or group of atom which are written before word root is called prefix. If the number of prefix are 2, 3 and 4 then to represent these numbers di, tri and tetra are used.

S.N	Substituent	Prefix
1)	R (CH_3, C_2H_5, C_3H_7)	Alkyl Methyl, ethyl, propyl, Butyl

2)	Halogen F Cl Br I	Floro (F) Chloro (Cl) Bromo (Br) Iodo (I)
3)	$-NO_2$	Nitro
4)	$-NH_2$	Amino
5)	$-OH$	Hydroxy
6)	CN	Cyno
7)	OR	Alkoxy
8)	CO	Keto
9)	$-N=N-$	Diazo
10)	CHO	aldo
11)	NO	Nitroso
12)	COOH	Carboxy

eg :-
$CH_3 - Cl$ ⇒ chloro methane

Word root :- Word root is the logest chain of carbon which is also known as parent chain or carbon chain

No of C-atom	Word root
1	~~alkane~~ Meth
2	eth
3	prop
4	But
5	Pent
6	Hex
7	Hept
8	Oct
9	Non
10	Dec

Primary suffix :- It is a term which identify whether the parent chain is saturated or unsaturated

No. of bond between C-atom	P.S
1	Alkane → saturated
2	Alkene → Unsaturated
3	Alkyne → Unsaturated

Secondary suffix (S.S) :- Secondary suffix is also called functional group. The group atom or group of atom which determine chemical compound is called functional group.

S.N	FUNCTIONAL group	S.S
1	-OH [Alcohol]	ol
2	-CHO [Aldehyde]	al
3	-CO (Ketone)	one
4	-COOH [carboxylic acid]	oic acid
5	-COO- [Ester]	oate
6	$-CONH_2$ [Amide]	Amide
7	-CN (cynide)	nitrile
8	-COX [carbonyll hdlide]	oyl hallide
9	$-NH_2$ (Amine)	Amine
10	-COOOC [Acid anhydride]	oic anhydride

Alcohol :- The organic compound which contains functional group -OH (Hydroxy) is called alcohol. The functional group of alcohol is -OH.

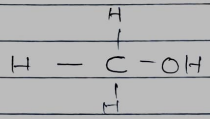
* It is represented by R-OH

where R → Alkyl
OH → Hydroxyl group

* The secondary suffix of alcohol is ol

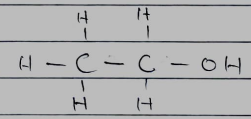
Examples of Alcohol.

1) Methanol



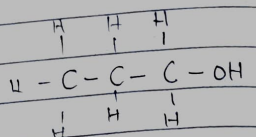
$\Rightarrow CH_3-OH$

2) Ethanol



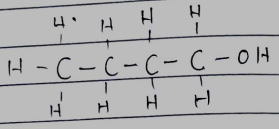
$\Rightarrow CH_3-CH_2-OH$

3) Propanol



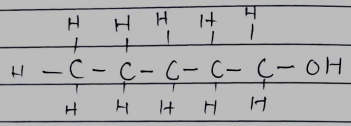
$\Rightarrow CH_3-CH_2-CH_2-OH$

4) Butanol



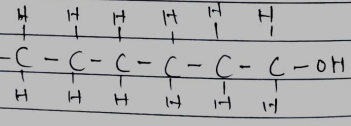
$\Rightarrow CH_3-CH_2-CH_2-CH_2-OH$

5) Pentanol



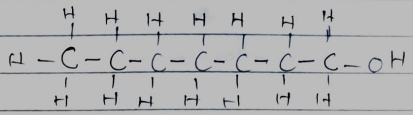
$\Rightarrow CH_3-CH_2-CH_2-CH_2-CH_2-OH$

6) Hexanol



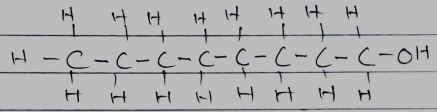
$\Rightarrow CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-OH$

7) Heptanol



$\Rightarrow CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-OH$

8) Octanol



$\Rightarrow CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-OH$

Nomenclature of some organic compound

1) $CH_3-\underset{\displaystyle CH_3}{CH}-CH-\underset{\displaystyle OH}{CH}-CH_3$

4-Methyl-pentan-2-ol

2) $CH_3-\underset{\displaystyle CH_3}{CH}-CH_2-CH_3$

2-Methyl Butane

3) $CH_3-\underset{\displaystyle CH_3}{CH}-CH_2-\underset{\displaystyle Cl}{CH}-CH_2-CH_3$

4-chloro-2-Methyl Heptane.