2. Structural & nomenclature

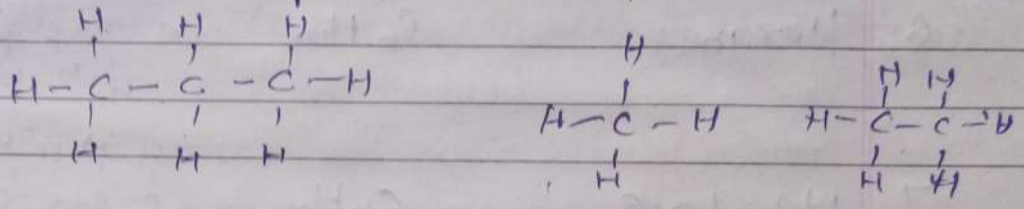
Alkane:-

- Alkane are the symplest organic compound made up carbon & Hydrogen only.
- they Have the general formulla

C_nH_{2n+2}

where $n = 1, 2, 3, 4$

The first three member of this class can be represented as



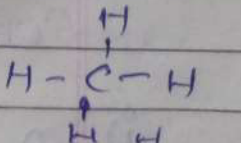
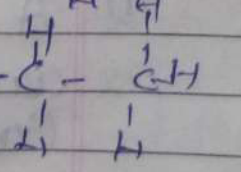
Propane methane ethane

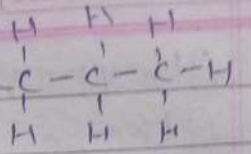
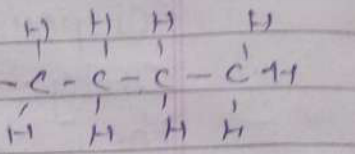
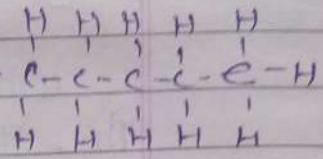
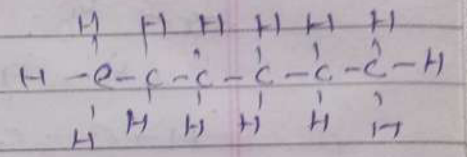
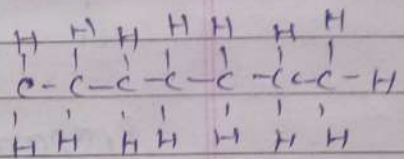
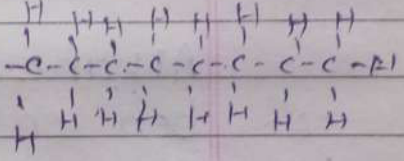
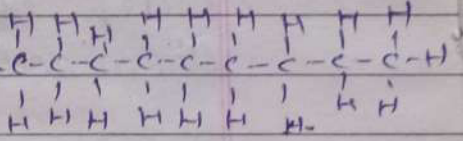
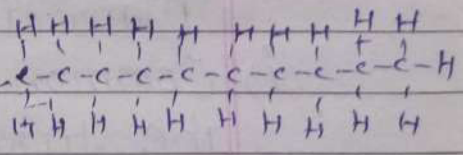
Alkane contain strongs C-C and C-H bon co-valent bond therefore this class of hydrocarbon are relatively chemically Inert

nomneclature:-

(i) Common name-

The first four member of this series are called by their common name methan, ethane, propane & Butane.

SNO	Name	molecular form	Structure
1	methane	CH_4	
2	ethane	C_2H_6	

3	Propane	C_3H_8	
4	Butane	C_4H_{10}	
5	Pentane	C_5H_{12}	
6	Hexane	C_6H_{14}	
7	Heptane	C_7H_{16}	
8	Octane	C_8H_{18}	
9	Nonane	C_9H_{20}	
10	Decane	$C_{10}H_{22}$	

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* Primery; Carbon - Secondary & tercery
→ The structural formulla of alkanes contain 4 types of carbon atoms

i) A carbon atom attached to one another carbon is called primery carbon. (1° carbon)

ii) A
Ca
Ce

iii) A
C
C

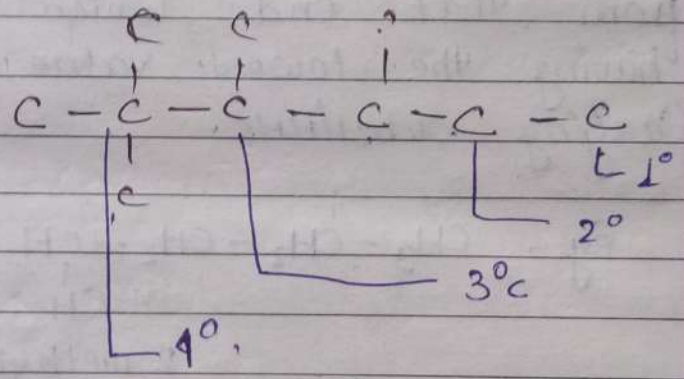
iv) A
C
C

→

ii) A carbon atom attached to two another carbon atom is called secondary carbon (2° carbon)

iii) A carbon atom attached to three another carbon is called tertiary carbon (3° carbon)

iv) A carbon atom attached to four carbon atom is called quaternary carbon (4° carbon)



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IUPAC system :- (International union of Pure & applied Chemistry)

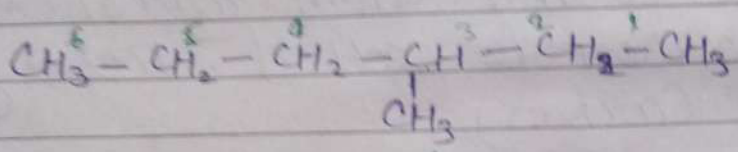
→ the common system has some limitation
pentane has three isomere
hexane has five isomere.
the more completed the alkane the gretter the number of special prefix needed to name the isomer.

— In ordered to device a system of nomenclature that could be used for even the most complected compounds committee of chemist have meat periodically.

→ The IUPAS System is much the same for all familyes of organic Compound

Step I Name the longest chain

Eg

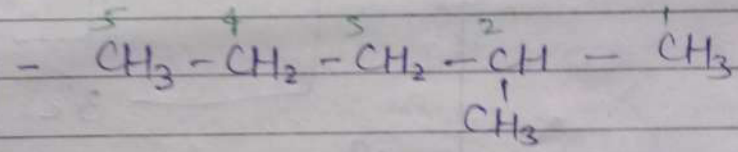


3-methyle heptane

Step II Number of the longest chain.

- The Carbon atoms is the longest chain are numbered. The numbering is started from that end which will give numbers having the lowest value to Carbons Carrying substitute.

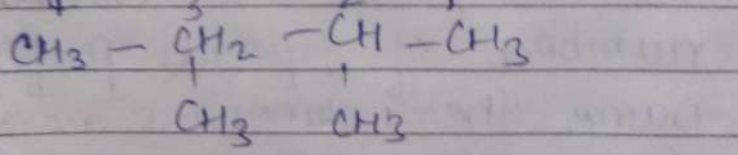
Eg



2 methyle pantane

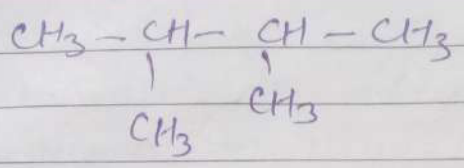
Step III located and name the Subtutent

Each Subtutent is named and the position of each Subtutent is indecated by the number of Carbon atom to which it is attached



Step IV Combind the longest chain and Substutent into the name

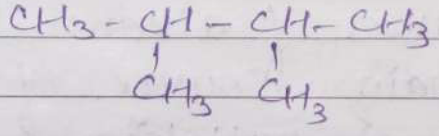
- The position and the name of Substituent are added to the name of the longest chain



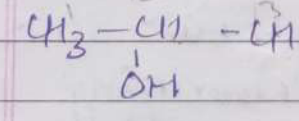
2,3 - dimethyl butane

Step V: Indicate the number and position of substituent.

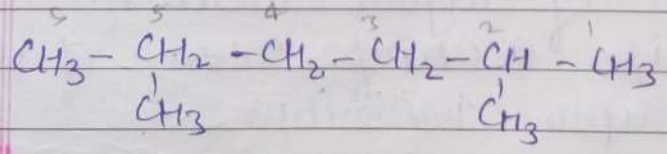
- If the same substituent is present two or more time in the molecule the number of this substituent is indicated by a prefix di, tri, tetra etc



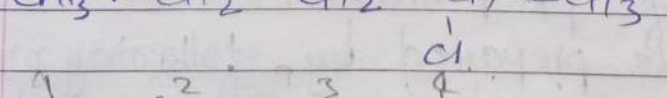
eg $CH_3-CH_2-CH_2-CH_3$ — Butane



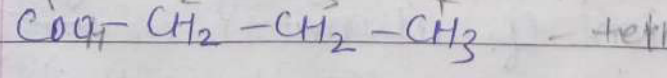
2-Butanol



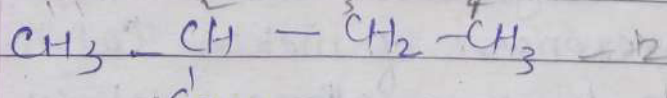
2,5 dimethyle hexane



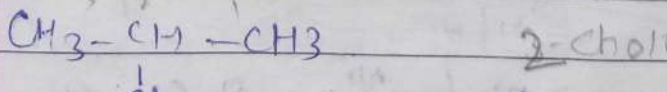
2-chloro pantane



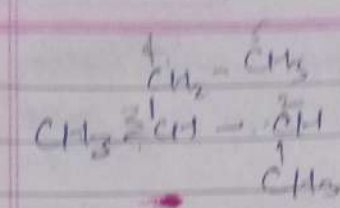
tetroic acid



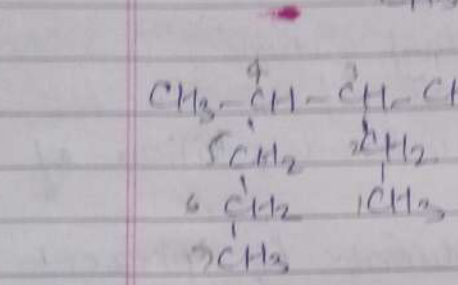
2 methyl Butanoic Ac.



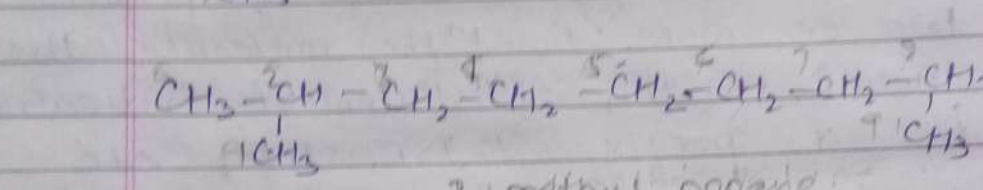
2-choloro propane



2,3-dimethyle pentane



2,4-dimethyl heptane



3-methyl nonane

** Natural source of alkane

- The two main source of alkane natural gas & petrolem bothe of these substance are fringulity found together in underground deposit. natural gas contain about 80% methane and 10% ethane. The remaining 10% mixture of higher member.
- Petrolium is chief source of alkane containg upto 40% cabons

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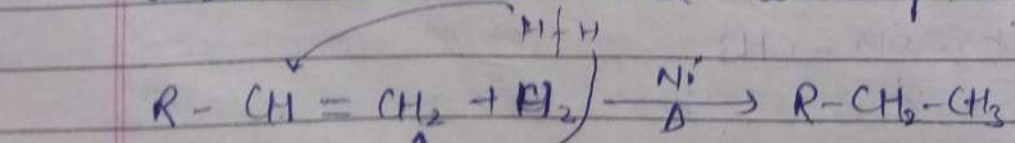
** Method of preparation -

- Alkane are prepared by following method

(i) → hydrogenation of alkene(=) or alkyne(≡).

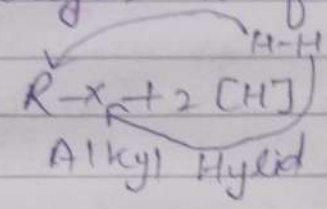
→ Alkenes or alkynes react with hydrogen in the presence of nickles catylist at 200-300°C to form alkanes. Other catylist which can be used are plateinum (Pt)



Alkene → Alkane

(ii) Reduction of alkyle Halide-

→ Alkyle halides undergo reduction with nascent hydrogen to form alkenes



~~Alkyle~~ where X = I, Br, Cl

(iii) Hydrolysis of g Grignard Reagent.

→ Alkyne magnacium halide (Grignard Reagnet) are obtaint by treating alkyle halide with magnasium in hydroun ether.

→ these treatment with wateu give alkane

$$Rx + Mg \xrightarrow{\text{ether}} RmgX$$

Alkylmagnesium Halide

$$RmgX + HOH \longrightarrow RH + mgX(OH)$$

Alkane

$$CH_3MgI + HOH \longrightarrow CH_4 + MgI(OH)$$

methylmagnesium Iodide — methane

(iv) Wurtz Reaction (Synthesis)

→ Higher alkanes are produced by heating a alkyle halide (R-X) with Sodium matel in dry ethey solution. Two molecules of the alkyle halide loss their Halogen atom. The net result in the joining two alkyle groop to yield a symmetrical

alkane having an given even number of carbon aton

Physical Properties:-

- First four alkane - methane, ethane, propane, Butane are gasious
- Next 15 number C_5 to C_{15} are colourless liquid.
- Higher alkanes are Wax like solid.

Solubility of Alkanes

→ Alkanes are non polar compound. There solubility characteristic may be predected by Commonly known as like dissolve like rule.

- What this rule means is that non polar compound are soluble in the other non polar solvend and that polar compound are generally soluble in other polar solvent

- Thus alkanes are soluble in the non polar solvent like carbon tetra Chloride and benzene but they are