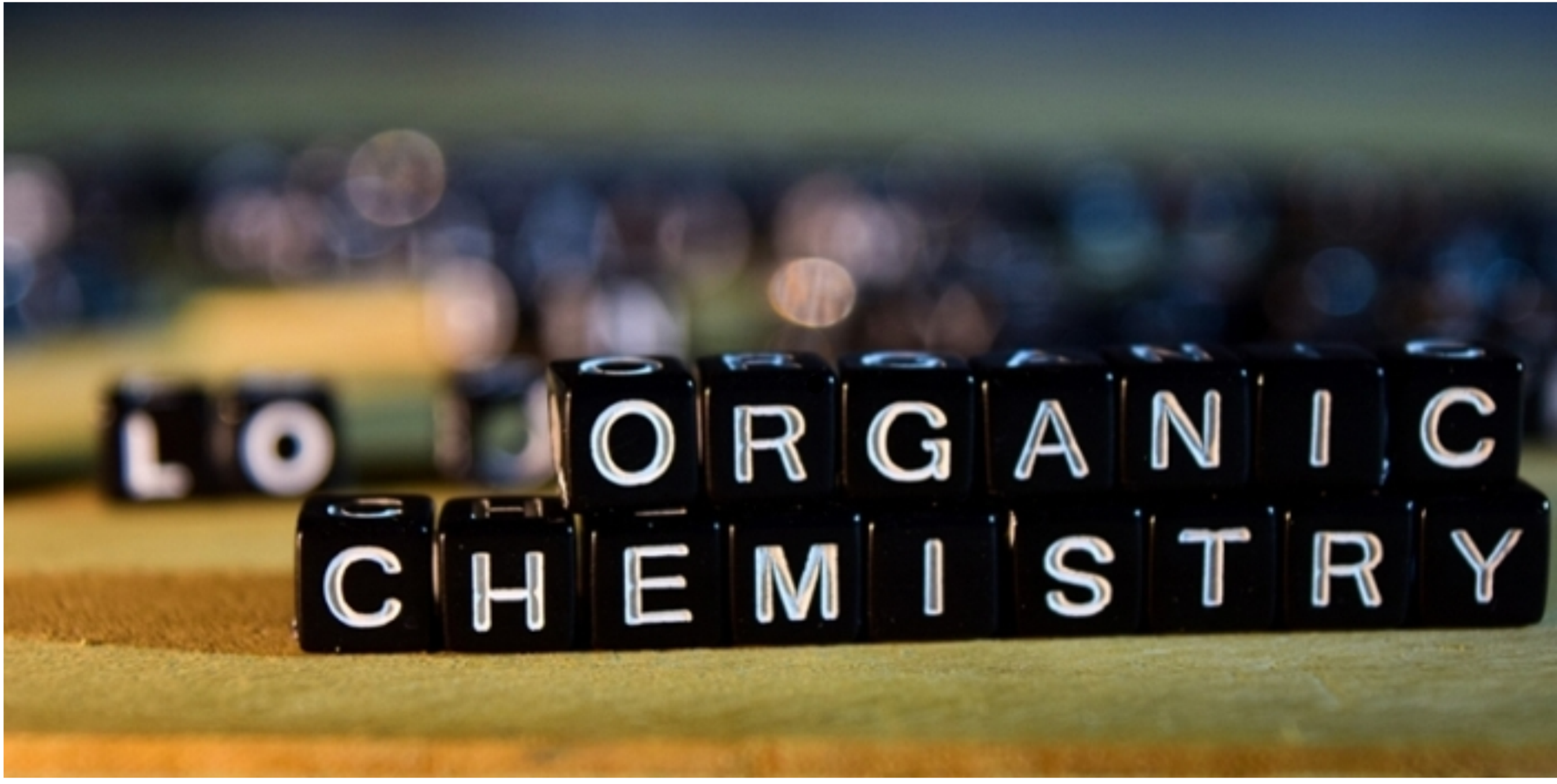
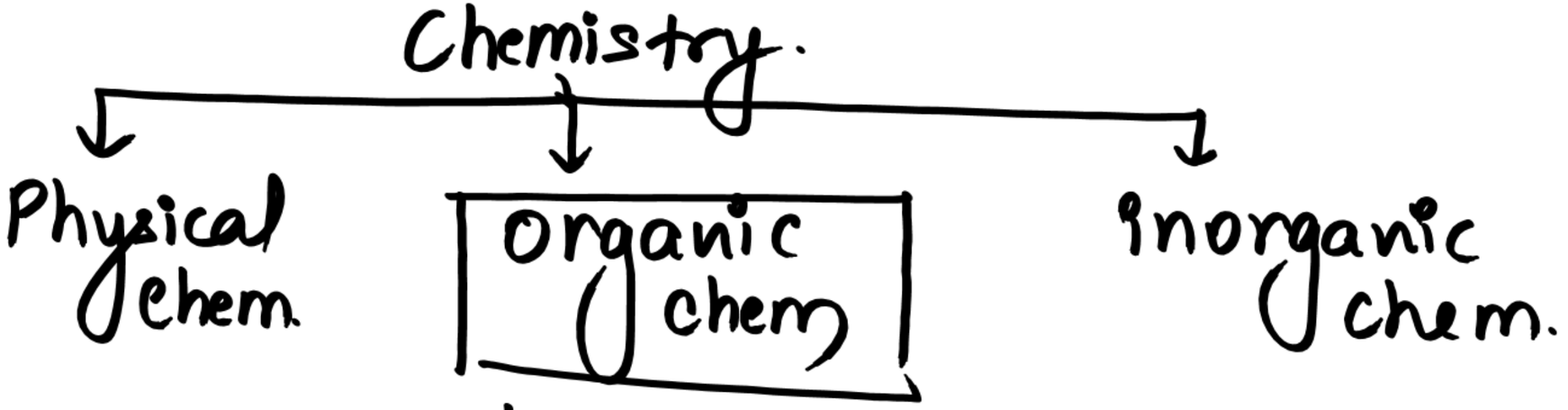

ORGANIC
CHEMISTRY



↳ NCERT

IX ⇒ Carbon & its compound
कार्बन एवं उसके यौगिक

XI ⇒ Hydrocarbon & its derivatives.

Organic chemistry
(कार्बोनिक रसायन विज्ञान)

↓

C and H

Carbon & hydrogen

+ S, Cl, Br, I, CH_3 ---
etc

⇐ Hydrocarbon or organic compound.

Organic chemistry / कार्बनिक रसायन विज्ञान.

* Hydrocarbon & its derivatives.

→ hydrogen + carbon → organic compound.

→ Present in all living organism.
सभी जीवित जीवो में उपस्थित होते है।

NH_4CNO → (NH_2CONH_2)

Ammonium cynate → Urea

1st artificial organic compound.

NOTE

1st artificially prepared hydrocarbon (कृत्रिम) ⇒ Urea [NH_2CONH_2]

Class 12 Bio NCERT → Miller's experiment ⇒ inorganic comp. से Urea बनाया

ex. CO (carbon monoxide) → inorganic compound (अकार्बनिक)

CO_2 (carbon dioxide) → inorganic comp.

CH_4 (methane) → carbonic/organic comp

C_2H_5OH (ethanol) → carbonic/organic comp

(carbon & hydrogen)

Study of organic compound is called organic chem.

(कॉर्बनिक यौगिकों का अध्ययन को कार्बनिक रसायन विज्ञान)

Carbon

↳ $^{12}_{6}C$

↳ 3 isotopes : $^{12}_{6}C$ $^{13}_{6}C$ $^{14}_{6}C$

$^{12}_{6}C$ → most abundant in atmosphere

$^{14}_{6}C$ → C-14 → radioactive → β-emitter.

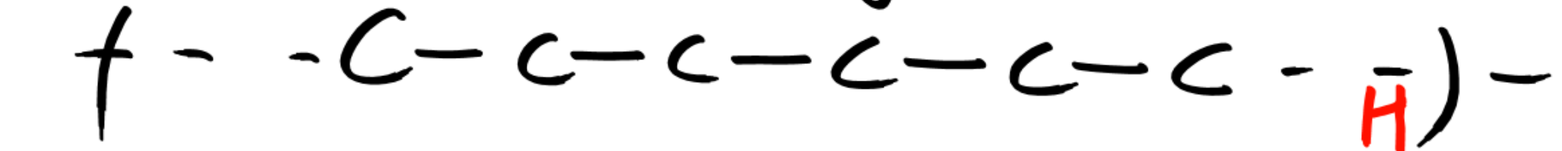
age of fossil (carbon dating) ↑

↳ allotrope

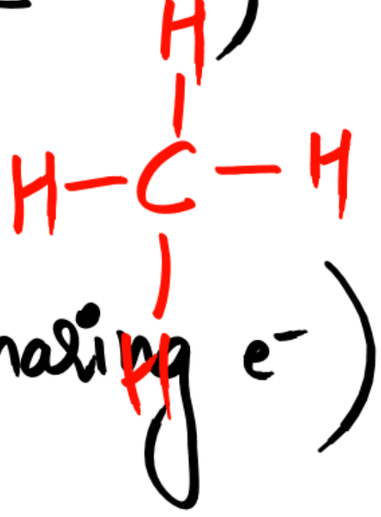
अपरूप ⇒ diamond, graphite, graphene, C-60 (fullerene), coke, coal etc.

Carbon → "unique Properties"

① Catenation : Self-linking property.

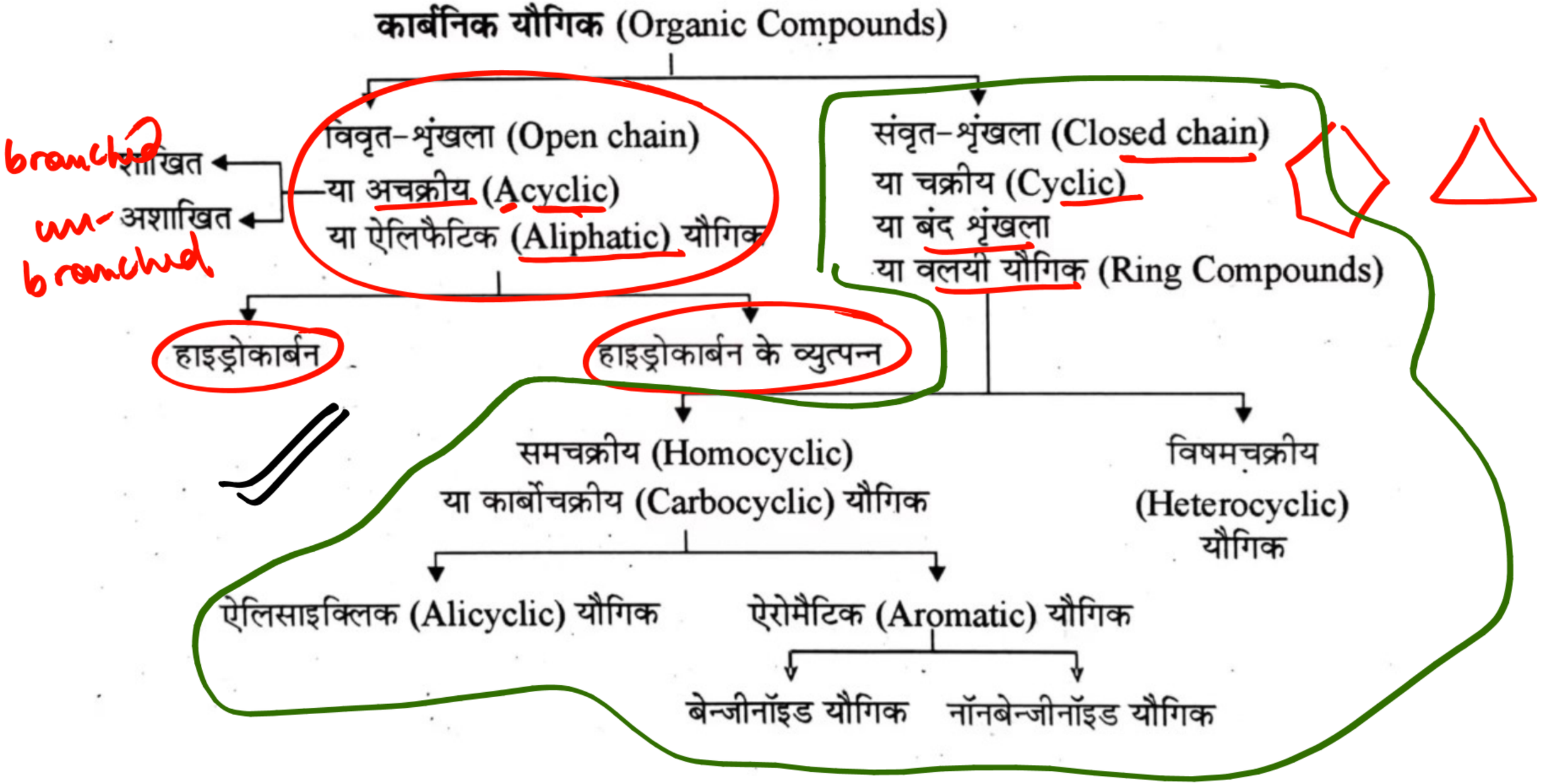


② Tetravalent ⇒ valency = ④

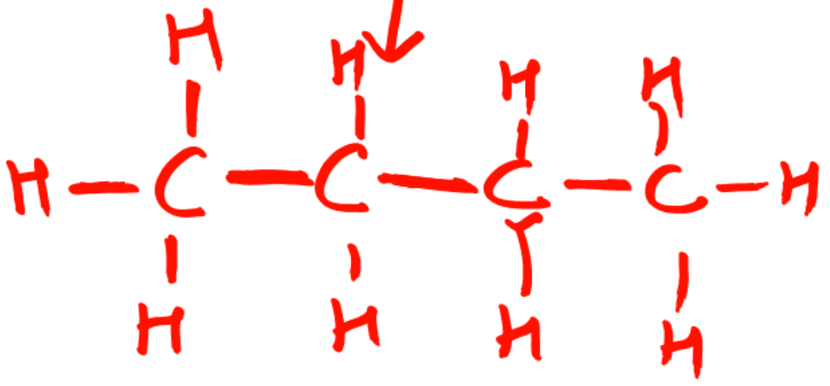


③ It forms Covalent bond (by sharing e⁻)
सह-संयोजक बंध

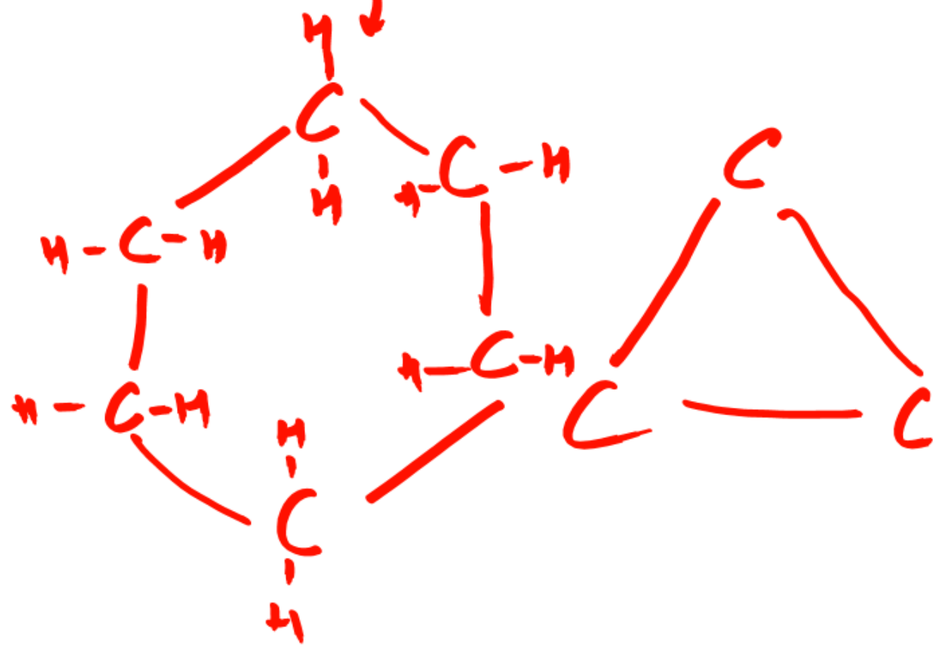
④ Allotropes.


कार्बनिक यौगिक (Organic Compounds)
विवृत-शृंखला (Open chain)
या अचक्रीय (Acyclic)
या ऐलिफैटिक (Aliphatic) यौगिक
शाखित
अशाखित
संवृत-शृंखला (Closed chain)
या चक्रीय (Cyclic)
या बंद शृंखला
या वलयी यौगिक (Ring Compounds)
हाइड्रोकार्बन
हाइड्रोकार्बन के व्युत्पन्न
समचक्रीय (Homocyclic)
या कार्बोचक्रीय (Carbocyclic) यौगिक
विषमचक्रीय
(Heterocyclic)
यौगिक
ऐलिसाइक्लिक (Alicyclic) यौगिक
ऐरोमैटिक (Aromatic) यौगिक
बेन्जीनॉइड यौगिक
नॉनबेन्जीनॉइड यौगिक

Organic compound

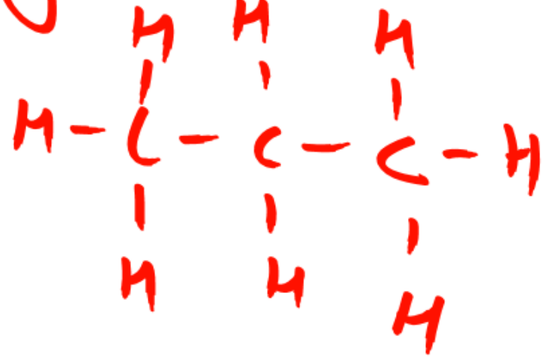


Open chain

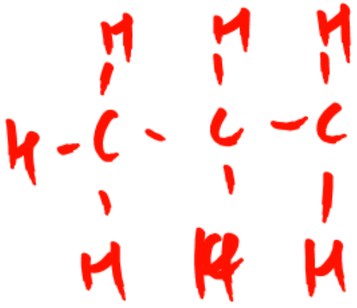


Closed chain.

Hydrocarbon.



derivatives.



@/Br/I etc.

Organic compound

- (विवृत) open-chain or Aliaphatic compound.
- closed chain (संवृत) or Ring compounds.

Hydrocarbon (हाइड्रोकार्बन)

- HC & its derivative (व्युत्पन्न)

→ compounds made of carbon & hydrogen only.

eg. CH_4 (methane), C_2H_6 (ethane)

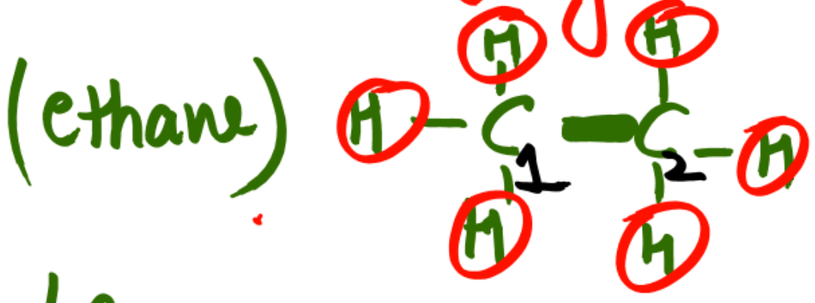
types →
- alkane (saturated HC) संतृप्त
- alkene } (unsaturated HC) असंतृप्त
- alkyne }

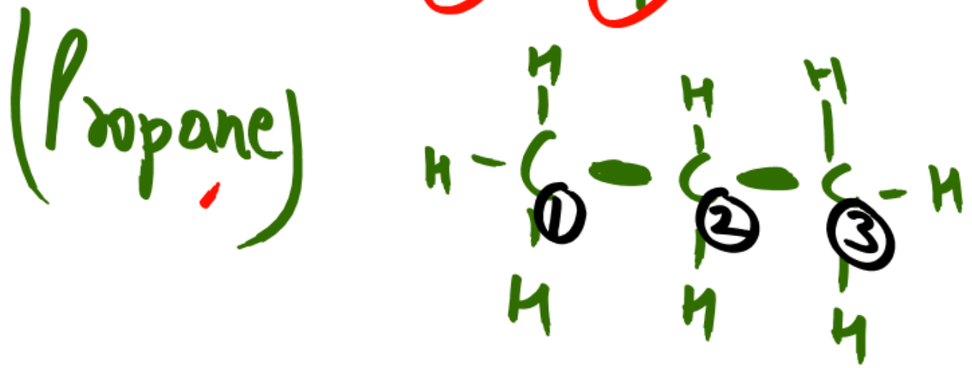
Hydrocarbon (H & C)

Saturated HC (संतृप्त HC)

Alkanes

C–C (single bond)

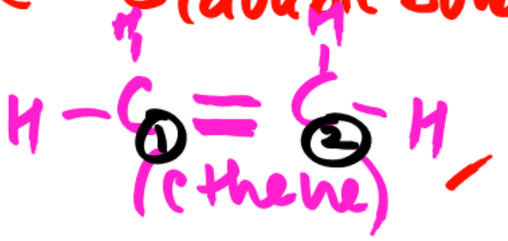


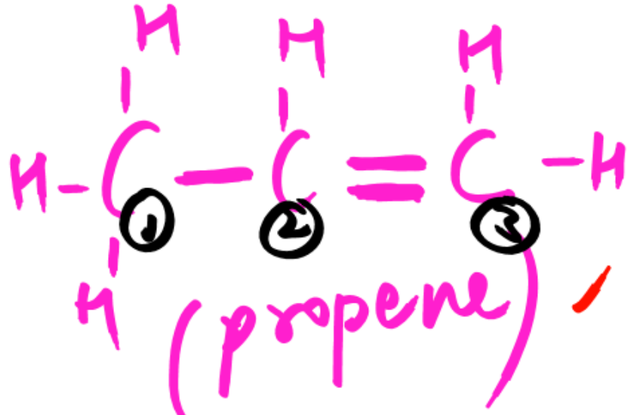


Unsaturated HC (असंतृप्त HC)

Alkenes

C=C (double bond)



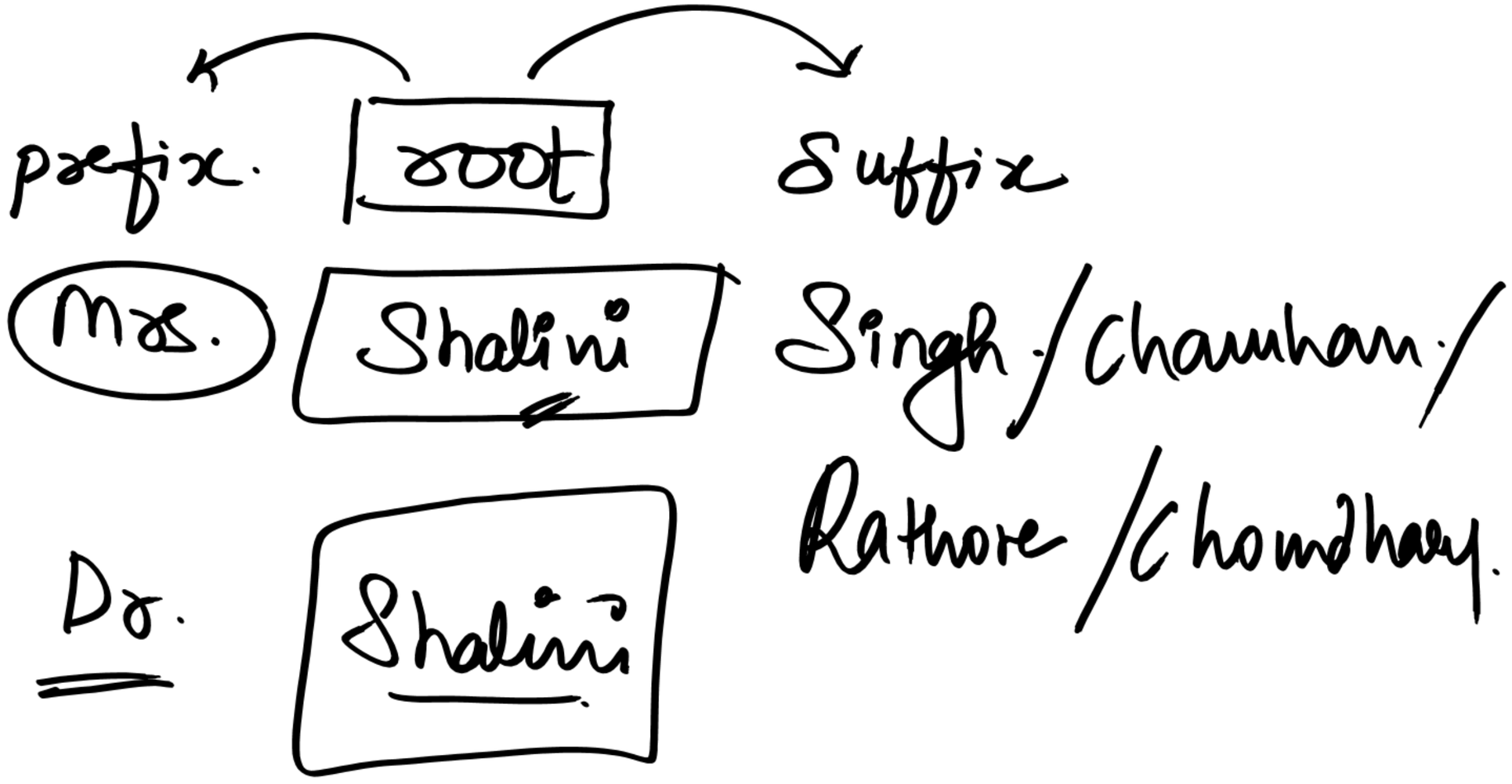


Alkynes

C≡C (triple bond)

H–C≡C–H
(ethyne)

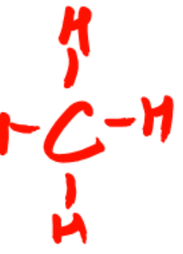
C–C≡C
(propyne)


prefix.
root
Suffix
Mrs.
Shalini
Singh / Chauhan /
Rathore / Chowdhary.
Dr.
Shalini

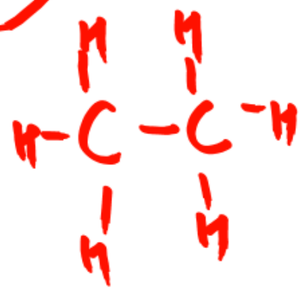
root (n = no. of carbon)

n = 1	meth
n = 2	eth.
n = 3	prop
n = 4	But
n = 5	Pent
n = 6	Hex
n = 7	Hept
n = 8	Oct
n = 9	non
n = 10	Dec

alkane (+ 'ane')

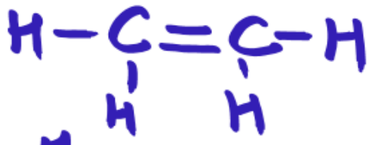


methane

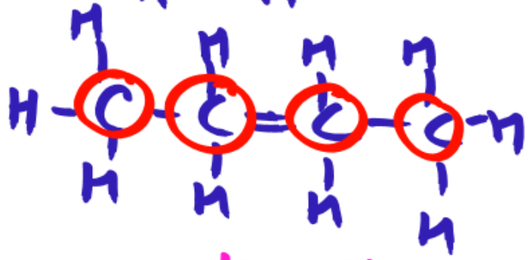


ethane

alkene (+ 'ene')

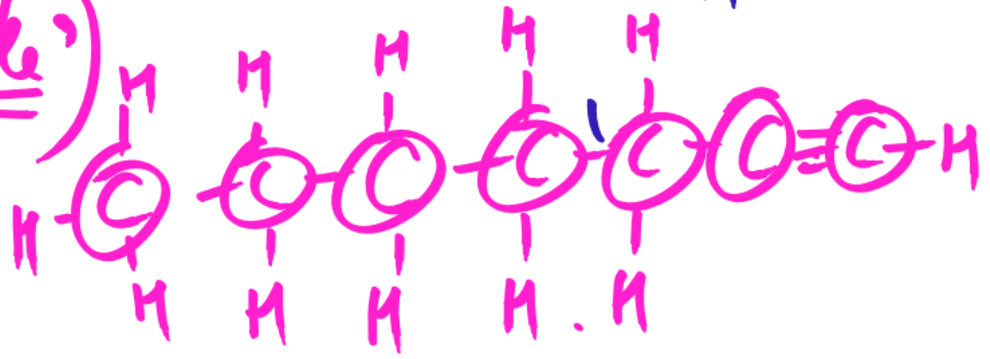


ethene

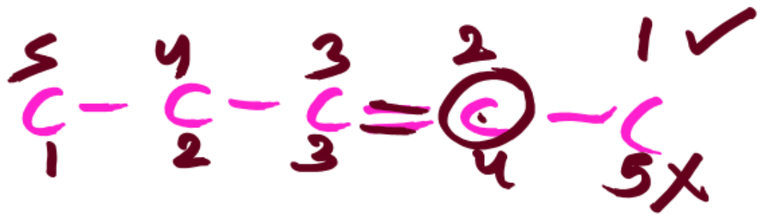


Butene

alkynes (+ 'yne')

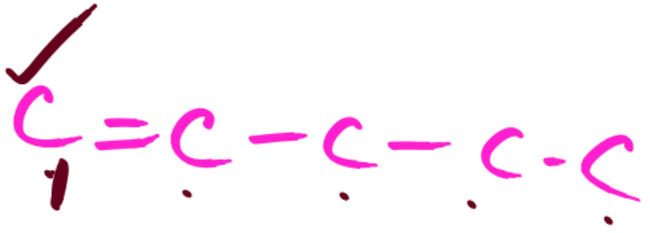


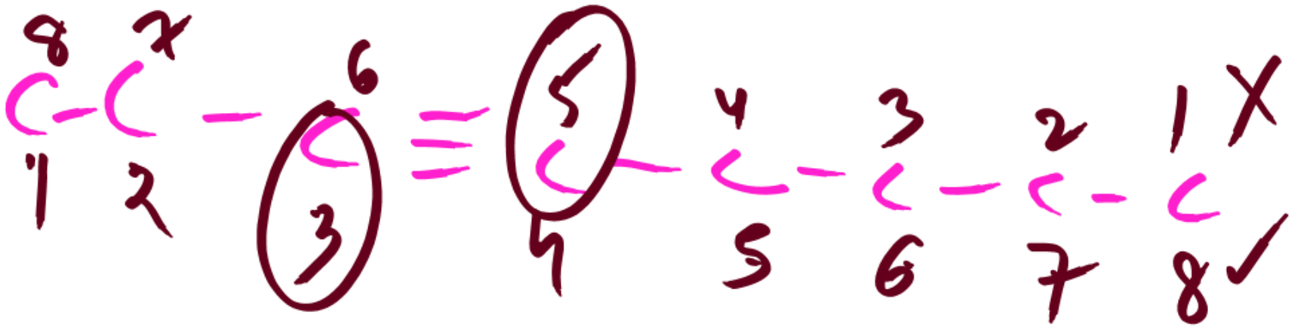
Heptyne

(a)  Pentene / Pent-2-ene

(b)  Propene / Prop-1-ene.

(c)  Heptane.

(d)  Pentene / Pent-1-ene.

(e)  octyne / oct-3-yne.

Chemical Formula

A chemical formula indicates the elements and their proportions in a compound.

Empirical Formula

C_2H_5

simplest whole number ratio

Molecular Formula

C_4H_{10}

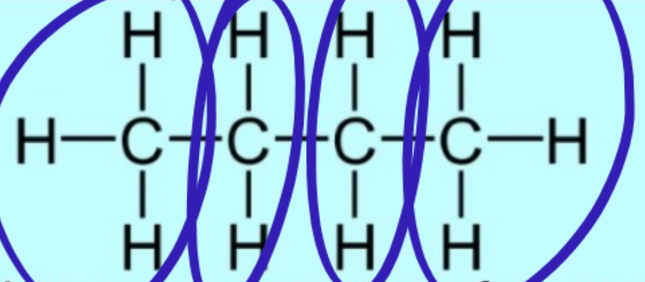
number and type of atoms

Condensed Formula

$CH_3CH_2CH_2CH_3$

order and formula of functional groups

Structural Formula



graphic representation of structure

Homologous series (सजातीय श्रेणी)

n = no. of carbon

General formula

	alkane (C_nH_{2n+2})	alkene (C_nH_{2n})	alkyne (C_nH_{2n-2})
n=1	$C_1H_{2+2}=CH_4$	X methene	methyne
n=2	C_2H_6	CH_2 $C_2H_{2\times2}=C_2H_4$	C_2H_2
n=3	C_3H_8	CH_2 C_3H_6	C_3H_4
n=4	C_4H_{10}	CH_2 C_4H_8	C_4H_6
n=5	C_5H_{12}	CH_2 C_5H_{10}	C_5H_8

Difference b/w 2 consecutive compounds in homologous series of alkane →

V.V.V.Imp

CH_2

C = 12 H = 1

12 + 2 = 14 amu/u.

mol. wt = 14 amu/u.

$CH_4 = 12+4 = 16$

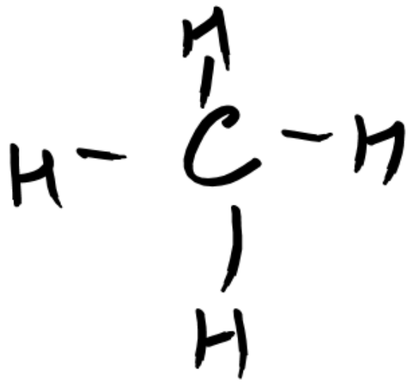
$C_2H_6 = 24+6 = 30$

14

$C_3H_8 \rightarrow 36+8 = 44$

14

methane



Hydrocarbon

Saturated संतृप्त HC

- Alkanes — (C_nH_{2n+2})
- Complete (पूर्ण दहन) combustion.
  - (प्रचुर O_2) → Sufficient amount of O_2.
  - → Blue flame (नीली ज्वाला)

Unsaturated असंतृप्त HC

- Alkenes = (C_nH_{2n})
- Alkynes ≡ (C_nH_{2n-2})
  - incomplete combustion अपूर्ण दहन
  - → पीली/लाल रंग ज्वाला (Yellow & red flame).

Hydrocarbon

(a) $C-C=C-C$ — Butene / But-2-ene.

(b) $C-C\equiv C-C-C-C$ — Hexyne / Hex-2-yne

(c) $C-C-C-C$ — Butane → cigarette lighter

(d) $C-C=C-C-C-C-C-C$ — Octene / oct-2-ene

(e) $C\equiv C$ — ethyne → natural hormone. / ethylene / acetylene. → artificial ripening of fruit

(f) $C=C-C$ → Propene / Prop-1-ene.

Derivatives of Hydrocarbon / (हाइड्रोकार्बन के व्युत्पन्न)

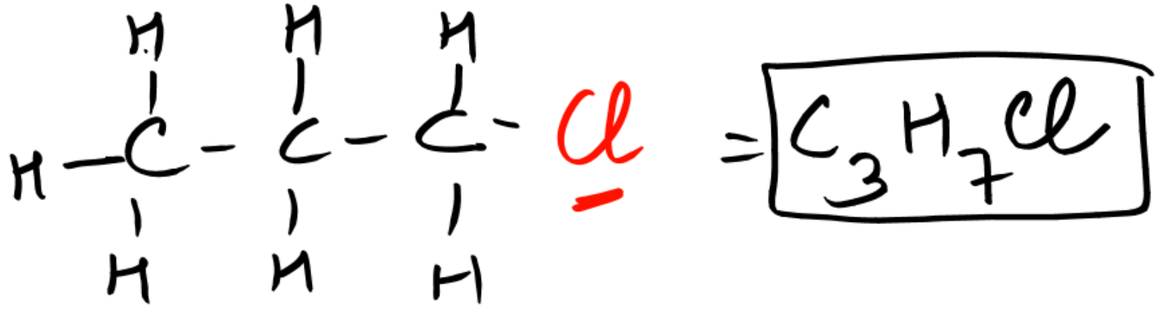
(a) Halogen (G-17).

F → Fluoro

Cl → Chloro

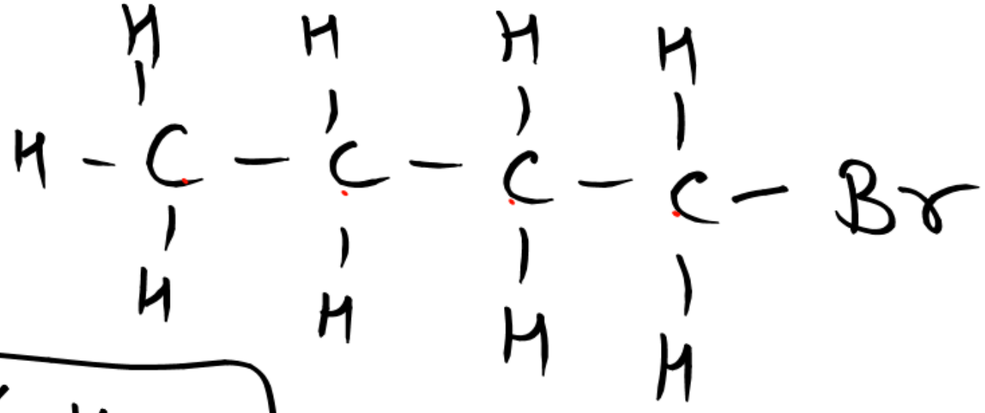
Br → Bromo

I → Iodo.

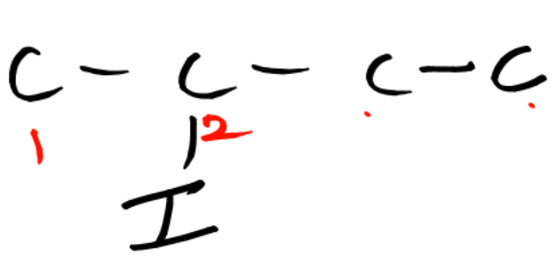
ex 

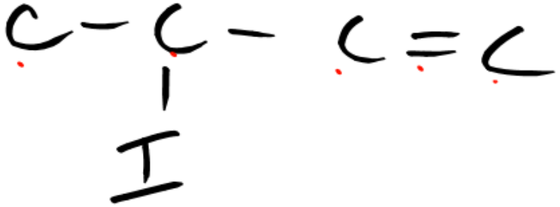
$= C_3H_7Cl$

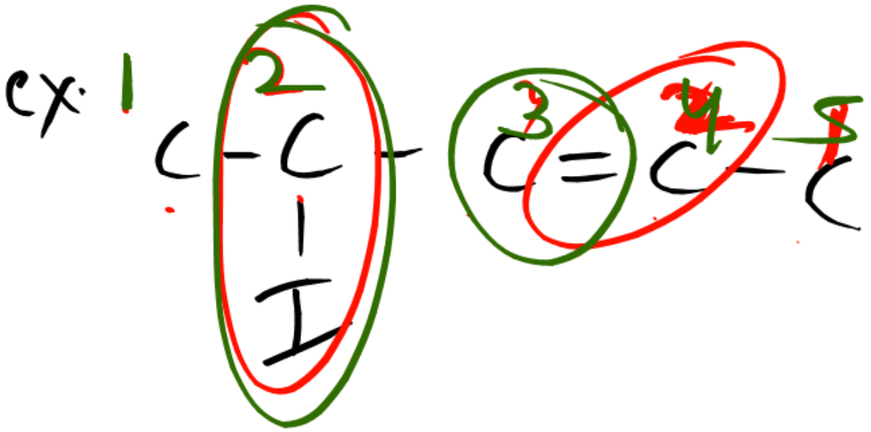
Propane − H + Cl = Chloropropane

ex. 

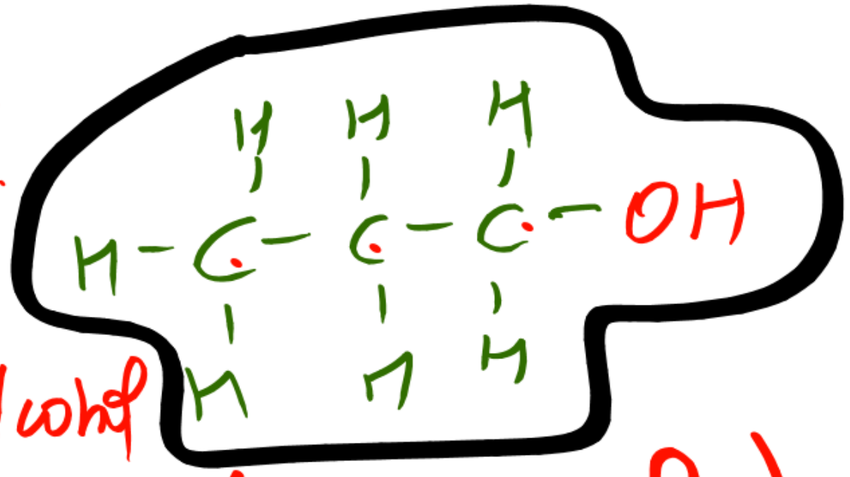
$C_4H_9Br \Rightarrow$ Bromobutane.

ex.  2-Iodobutane

ex.  2-Iodobutene

ex.  2-Iodo Pent-3-ene

② Alcohol (-OH) Hydroxy group.



$= C_3H_7OH$

(Propanol).

(HC-H + hydroxy group (-OH) = Alcohol

↳ 'ol' is used as suffix.

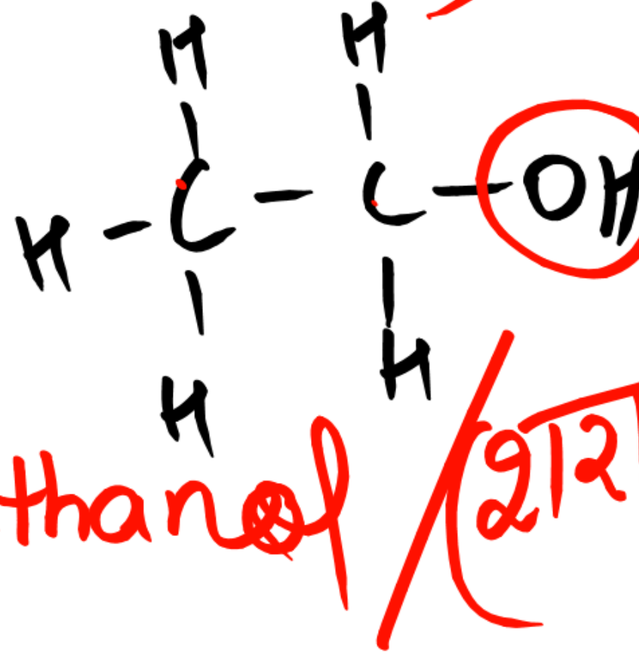
nomenclature

Alkane - e + ol

Alkene - e + ol

alkyne → e + ol

ex.

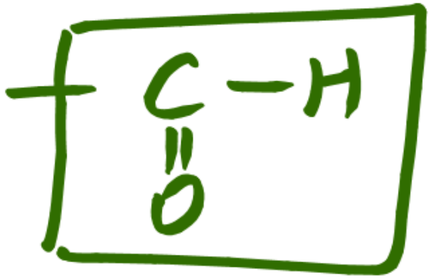


$= C_2H_5OH$

Ethanol / (एथानॉल)

③ Aldehydre (-CHO group)

Suffix = "al"

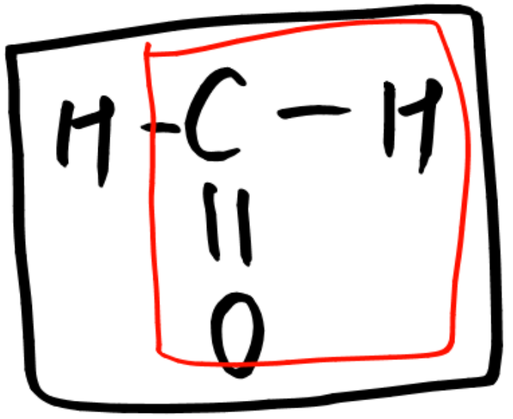


Alkane − e + al = alkanal

alkene − e + al → alkenal

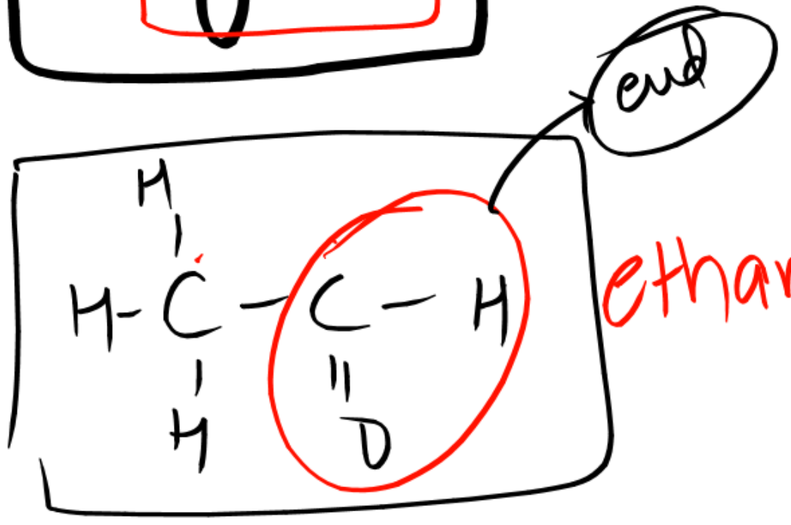
alkyne − e + al → alkynal.

ex

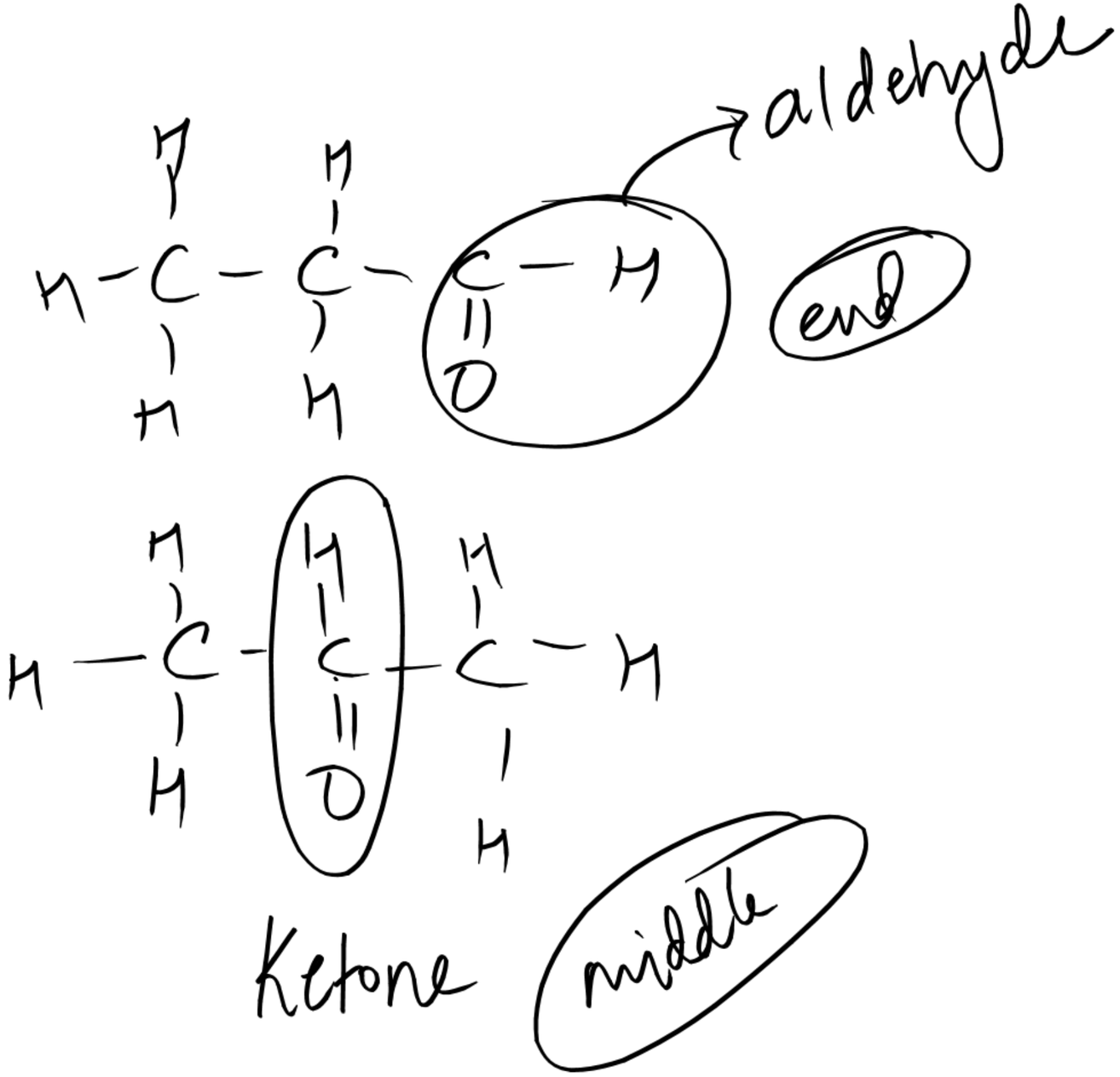


methanal

ex.



ethanal


aldehyde
end
Ketone
middle

(4) Ketone — C(=O) — CO-group

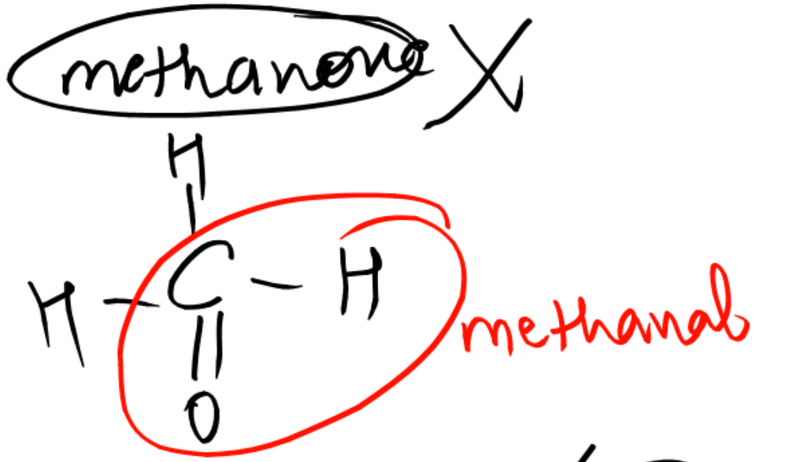
↳ alway in b/w the chain

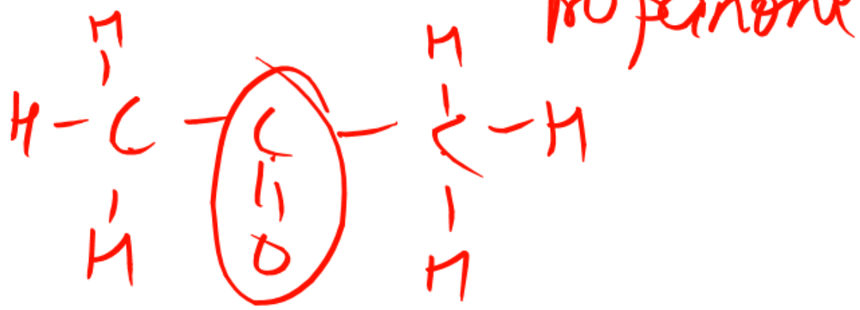
Suffix = "one".

alkane - e + one = Alkanone

alkene - e + one = Alkenone

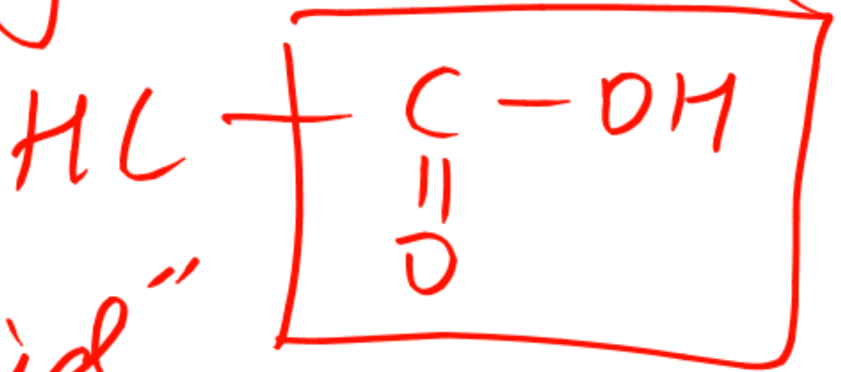
Alkyle - e + one = Alkynone.





(5) Carboxylic acid — (COOH) group

1C → form
2C → acet



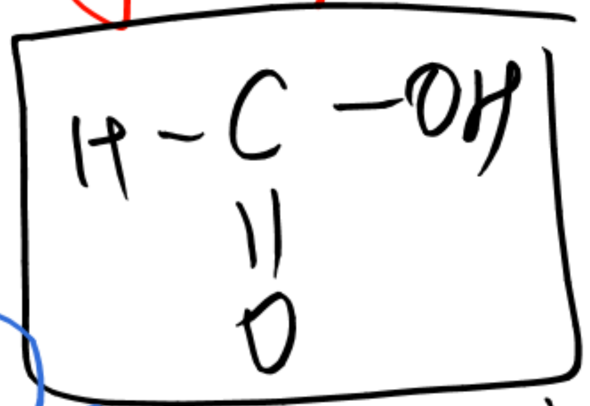
Suffix = "oic acid"

alkane − e + oic acid = alkanoic acid

alkene → e + oic acid = alkenoic acid

alkyle → e + oic acid = alkyloic acid

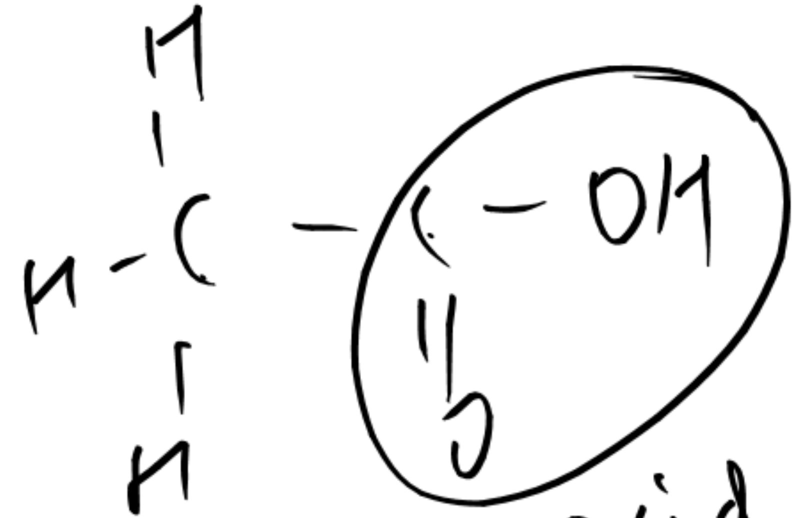
ex.



methanoic acid or formic acid

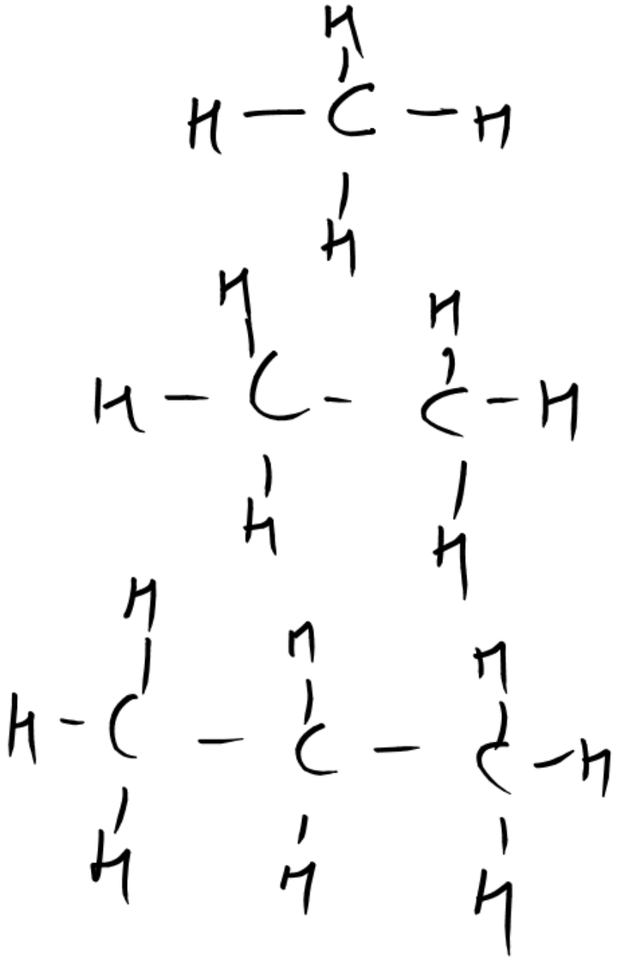
red ant, bee-sting, nettle leaves

ex.



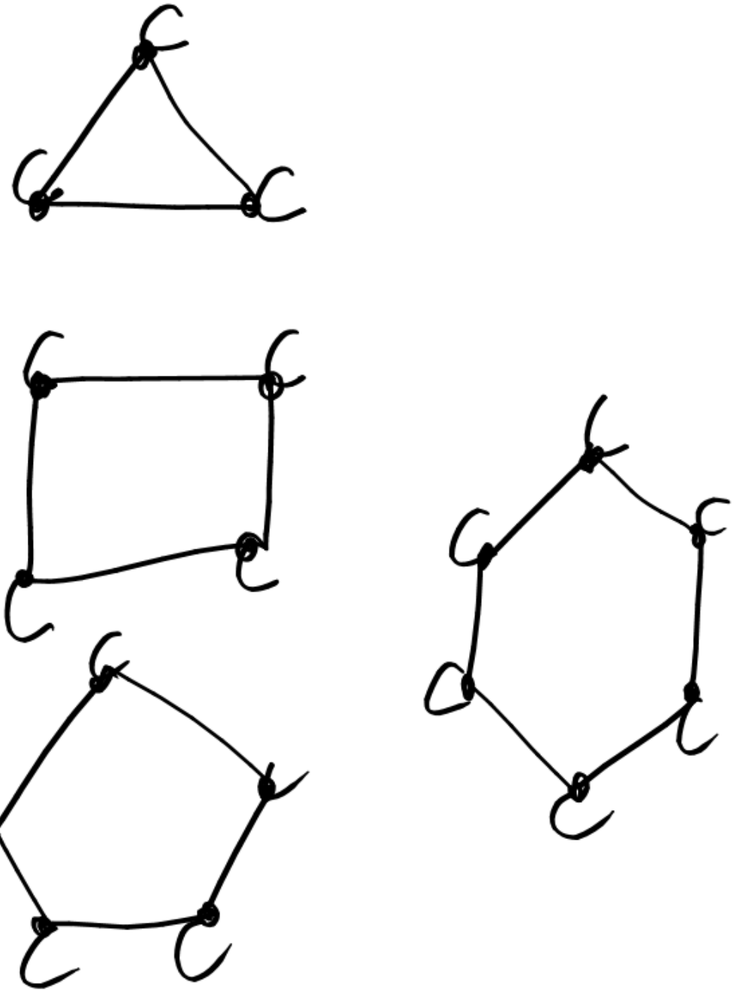
(सिरका) acetic acid or ethanoic acid

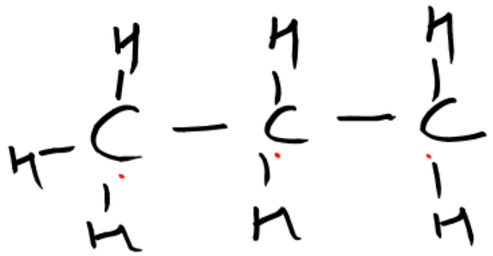
Open chain str.



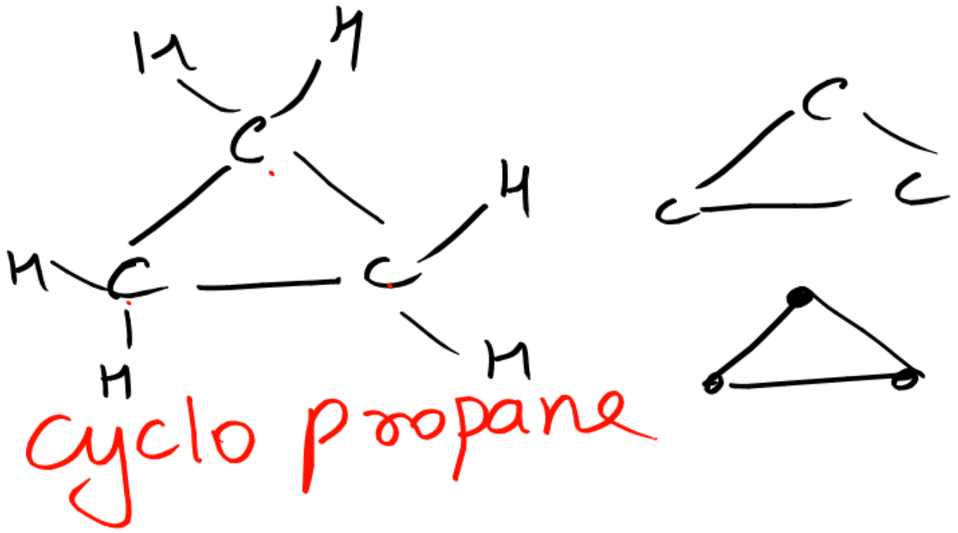
closed chain str

Min = 3-carbon

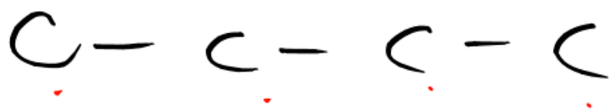




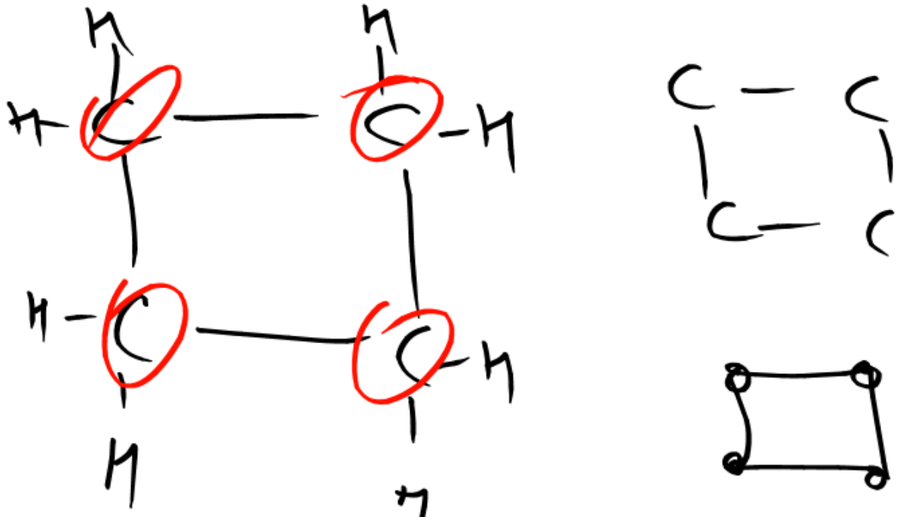
propane



cyclo propane



butane

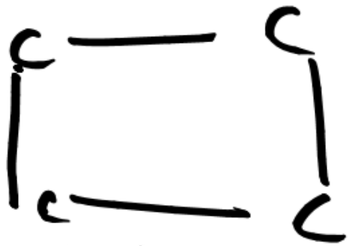


cyclobutanane

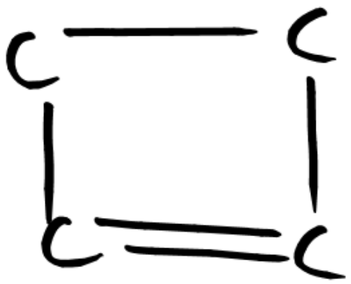
cyclopropane

cyclopropene

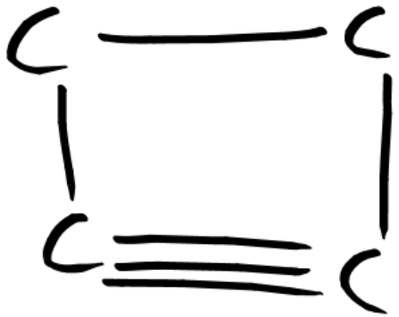
cyclopropyne



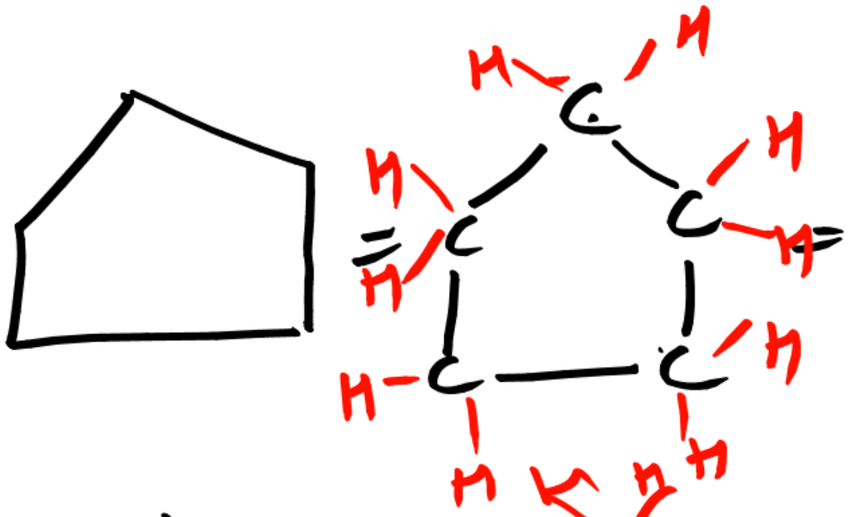
cyclobutane



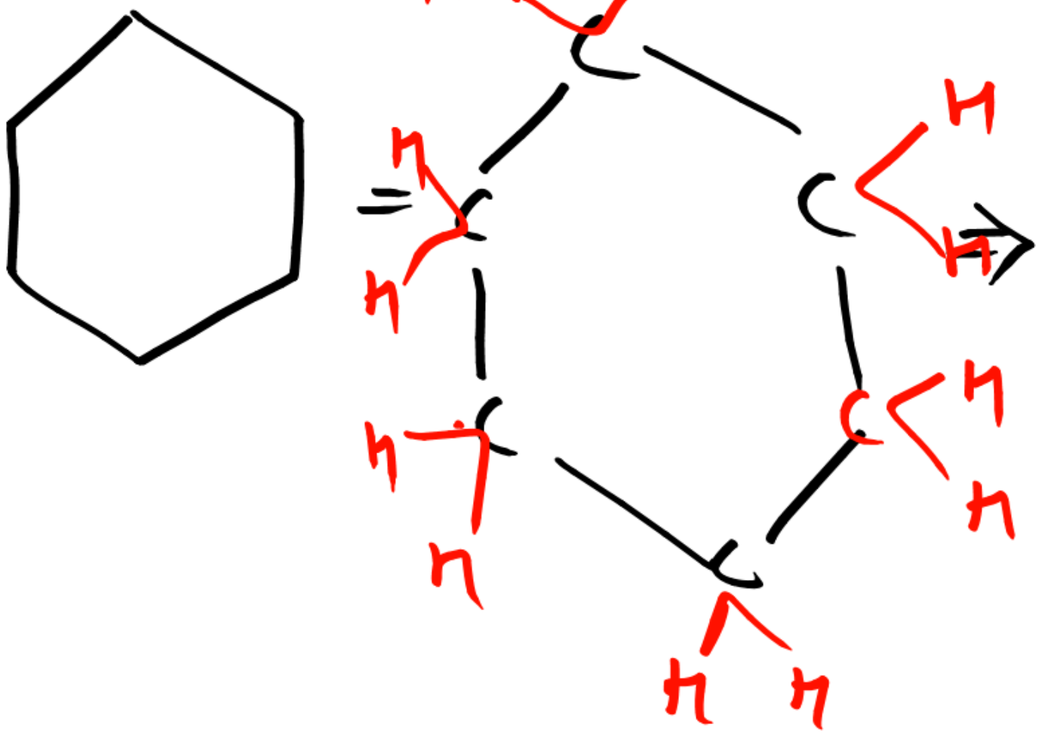
cyclobutene



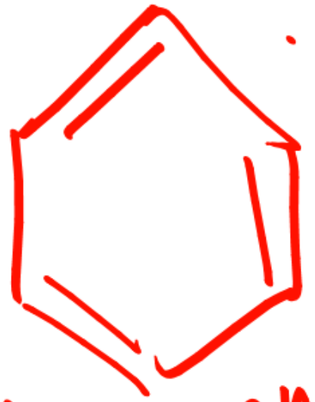
cyclobutyne.



cyclopentane



cyclohexane.



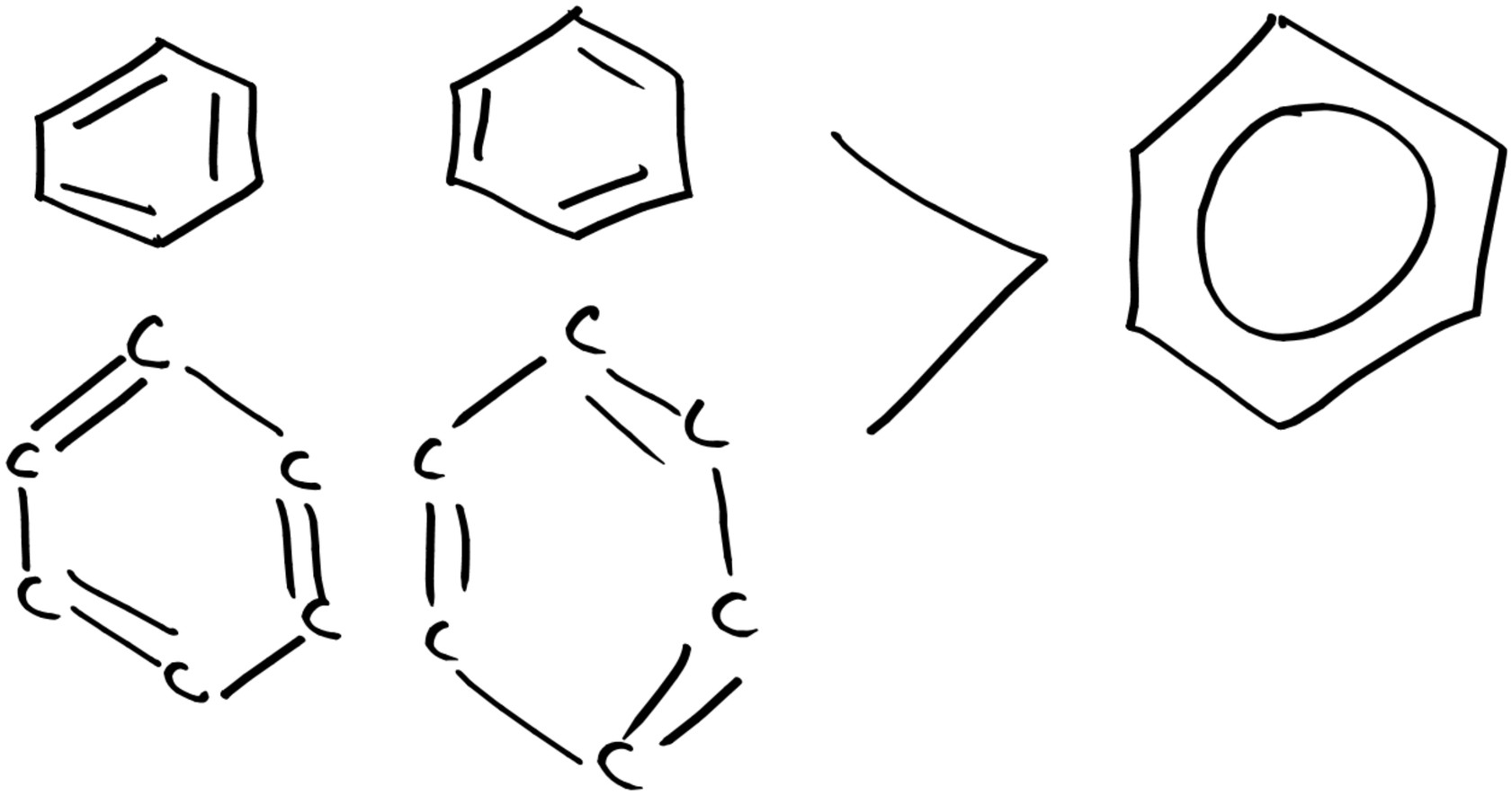
"benzene"

Saturated Cyclic Hydrocarbon

Unsaturated Cyclic Hydrocarbon

Aromatic Hydrocarbon

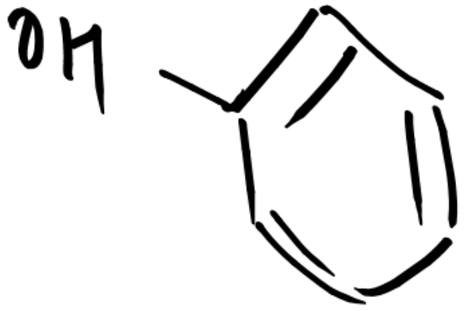
Benzene = C_6H_6



→ belongs to <u>Aromatic</u> HC.
(सुगन्ध)

→ immisible in water (जल में घुलनशील नहीं होते)

→ inflammable / burn with sooty flame
ज्वलनशील पार्तिख वाली ज्वाला



⇒ hydroxybenzene / Phenol.

NOTE: Ethylene is the only gaseous plant hormone.