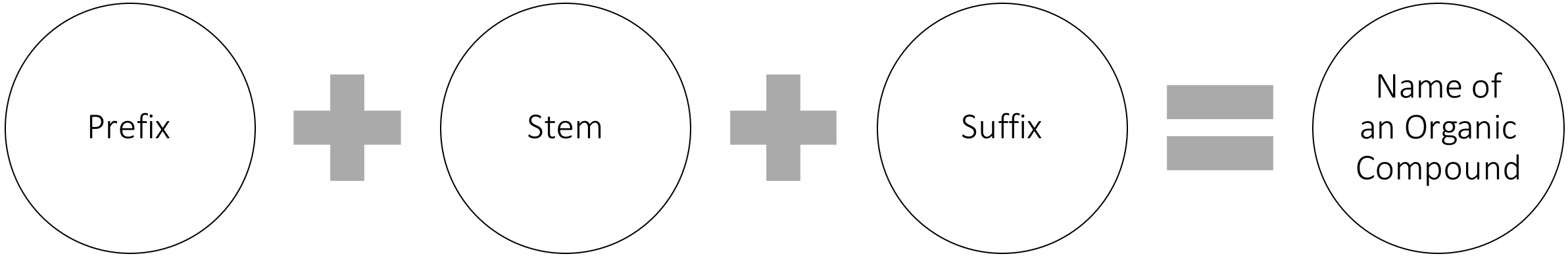
Naming Organic Compounds

Naming Simple Organic Compounds



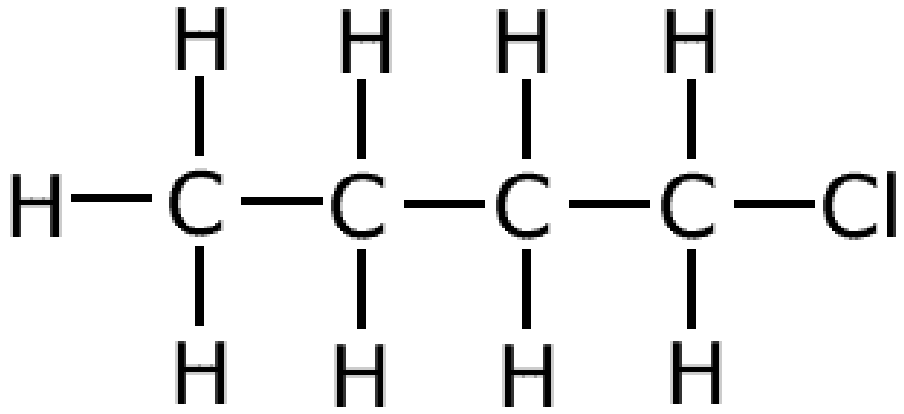
For **some** homologous series, the functional group appears as a prefix before the stem e.g. chloro-, bromo-, fluoro-, OR cyclo-

Tells us how many carbon atoms there are in the main chain e.g. meth-, eth-, prop-, but-, pent-, hex- hept- oct-, non-, dec-

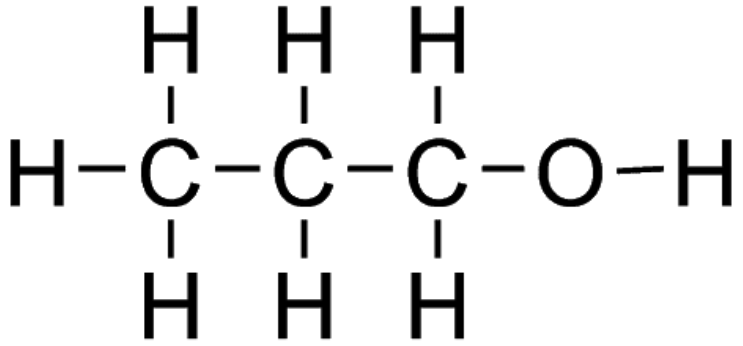
Tells us the functional groups present. E.g.

- -ane (alkanes)
- -ene (alkenes)
- -ol (alcohols)
- -oic acid (carboxylic acids)
- -al (aldehydes)
- -one (ketones)

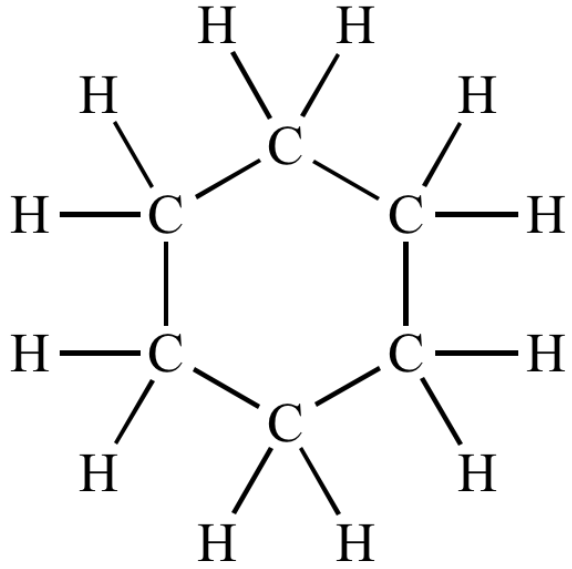
Quick Exercise – Name the following compounds



Chlorobutane

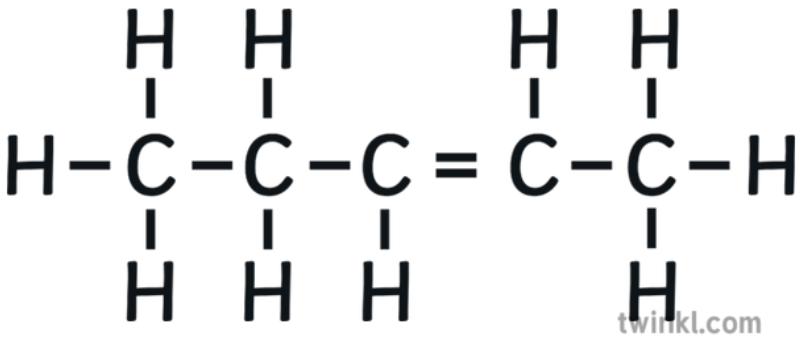


Propanol

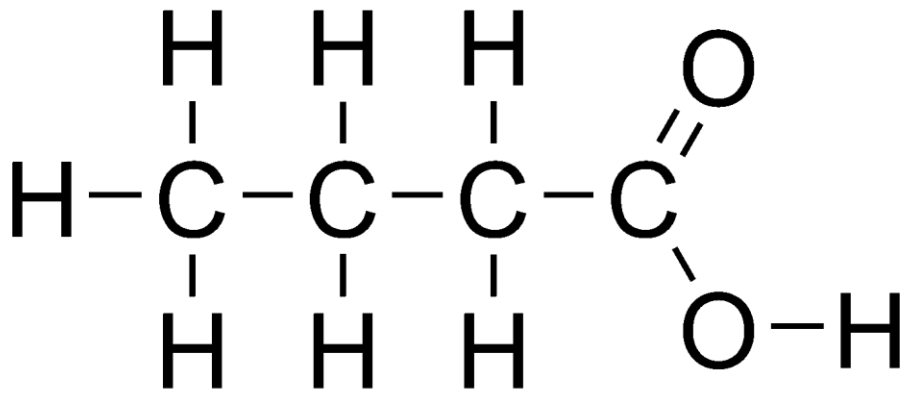


Cyclohexane

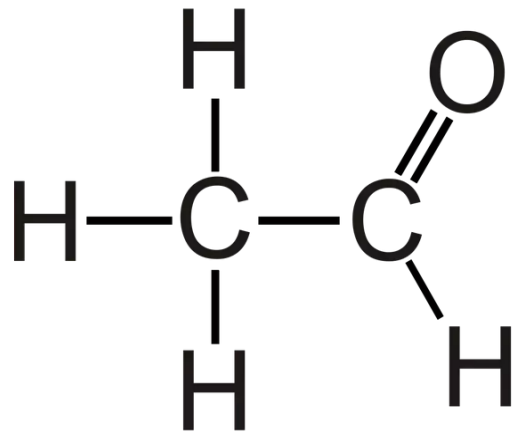
Quick Exercise – Name the following compounds



Pentene



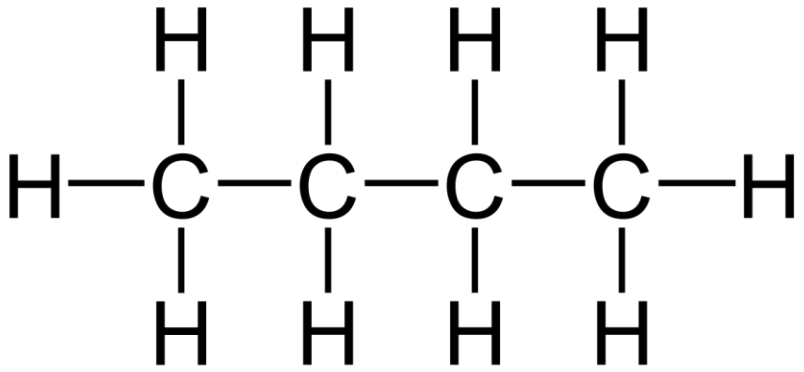
Butanoic Acid



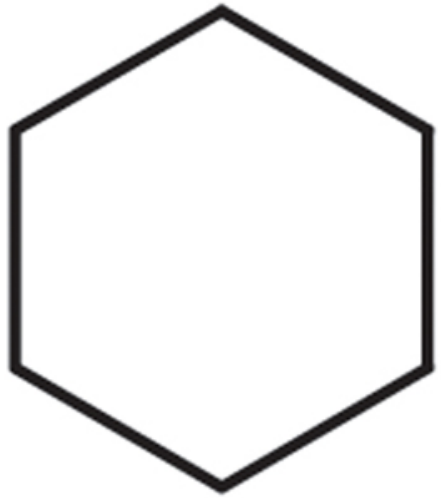
Ethanal

Naming Alkanes

- Aliphatic versus Alicyclic
- 'Cyclo' for alicyclic compounds



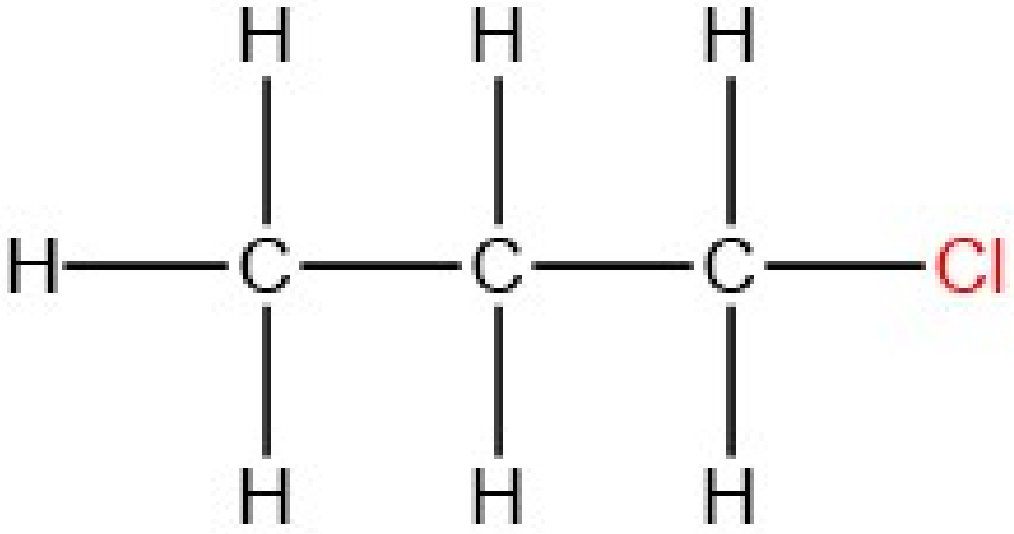
Butane
(Aliphatic)



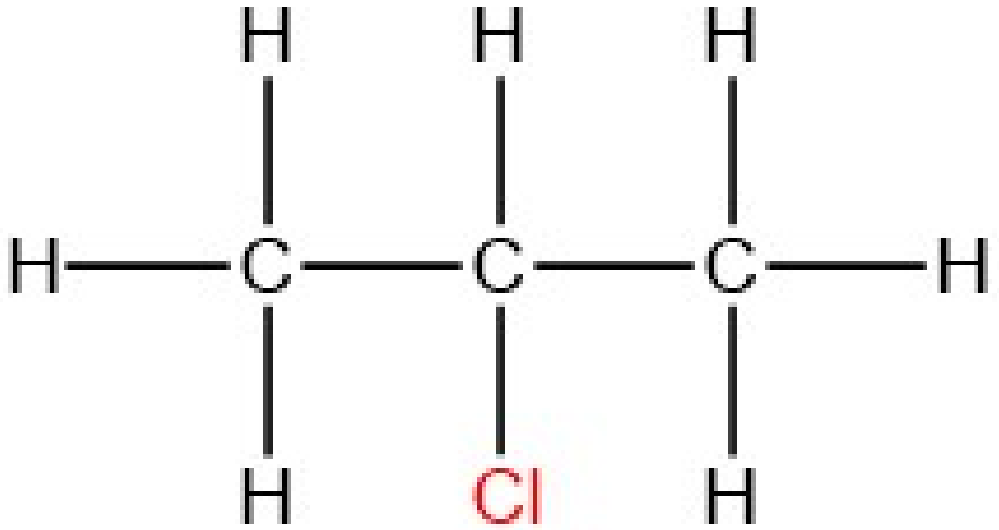
Cyclohexane
(Alicyclic)

Naming Alkanes

- Functional Groups on Alkanes



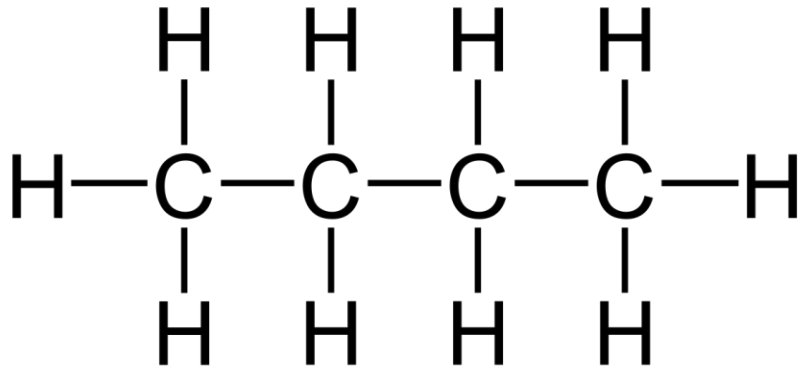
1-chloropropane



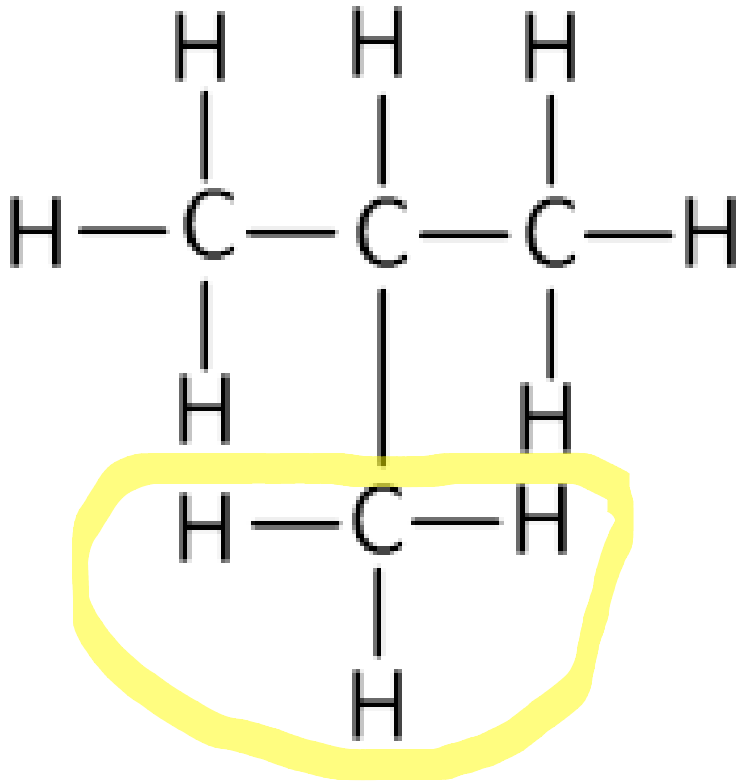
2-chloropropane

Naming Alkanes

- Functional Groups on Alkanes

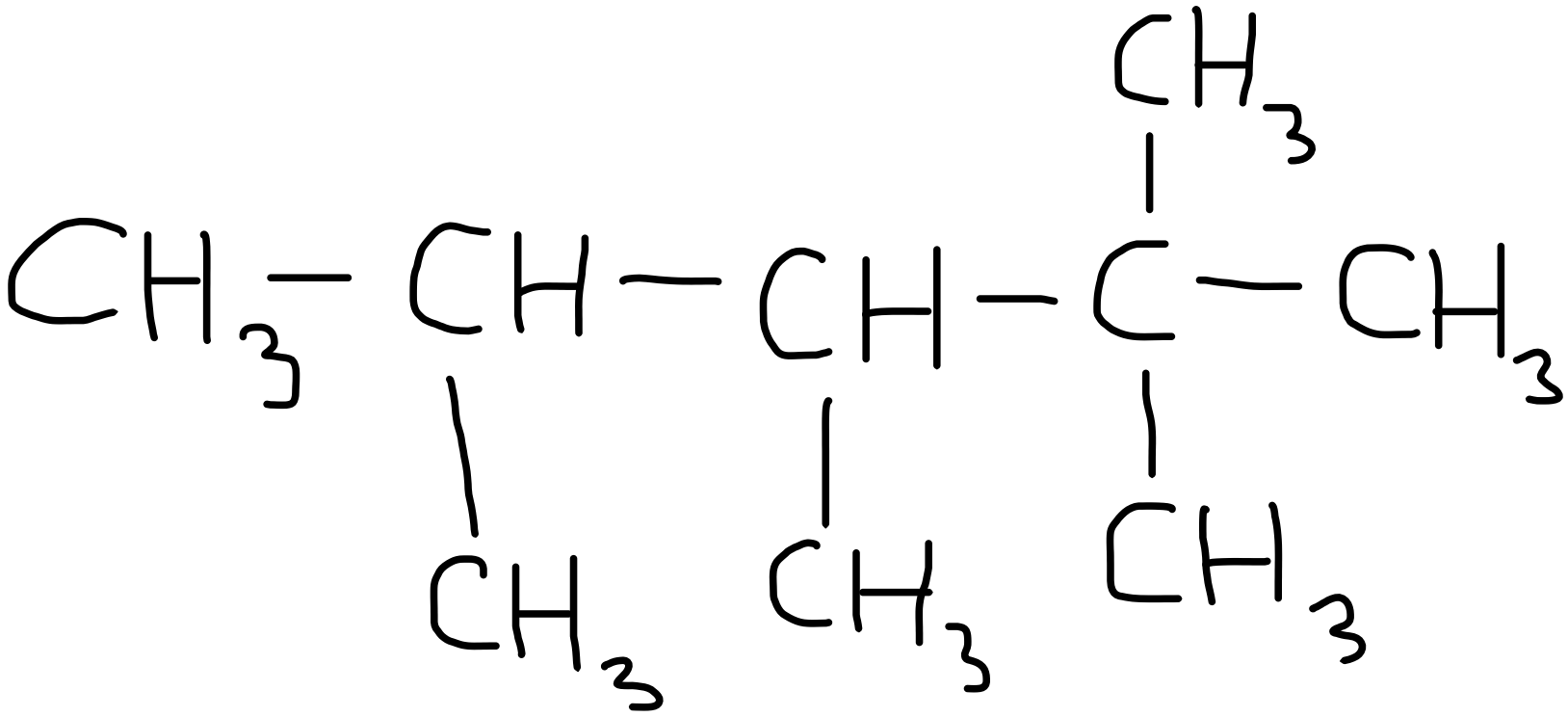


Butane



2-methyl propane

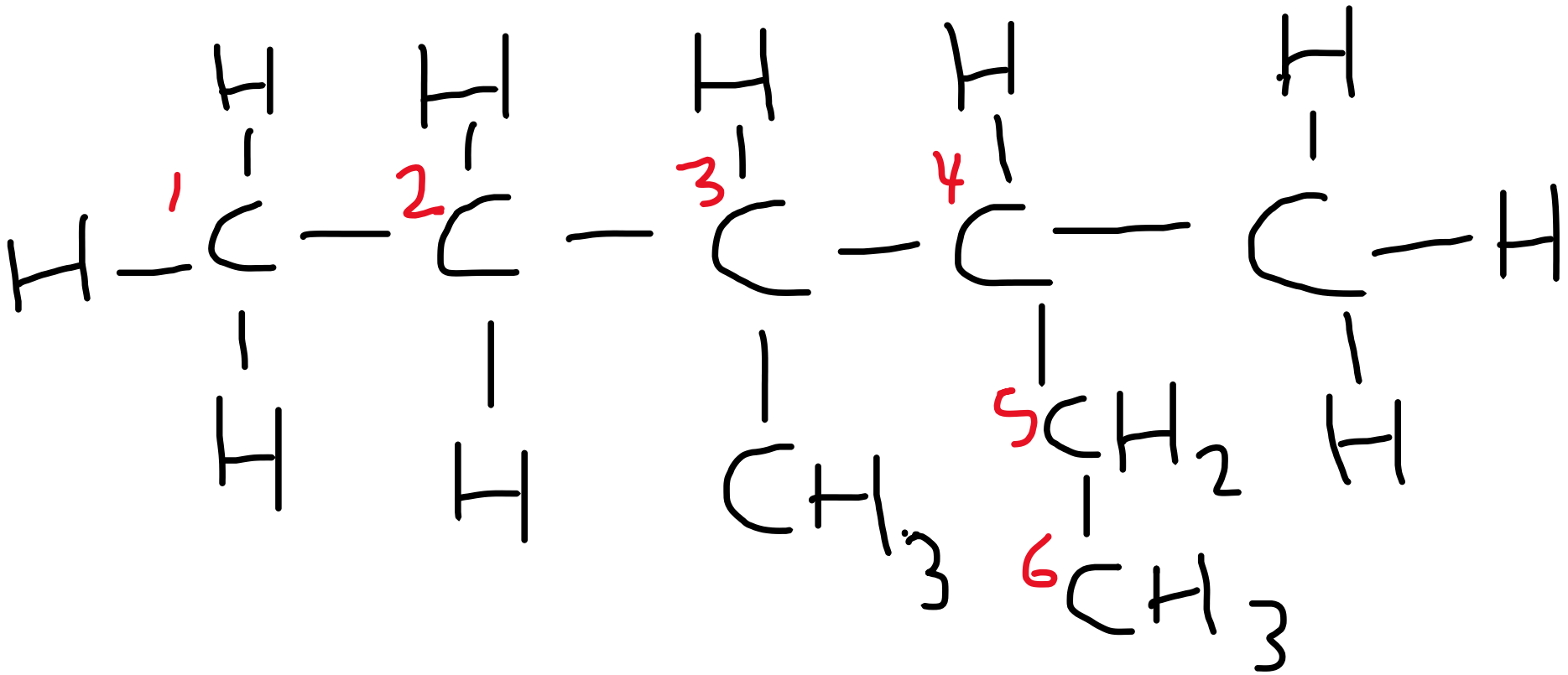
What is the name of this structure?



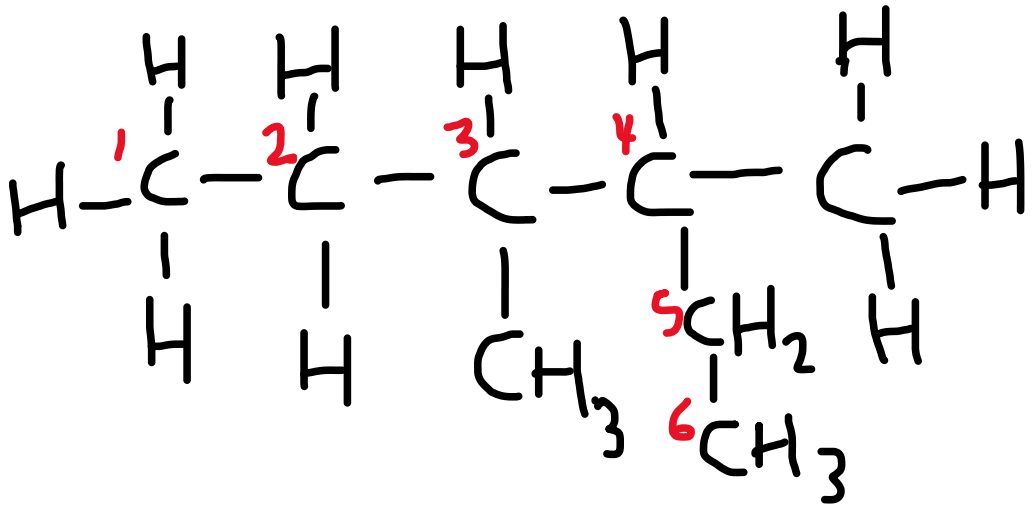
- **Answer: 2-dimethyl-3-methyl-4-methyl pentane**

Naming Alkanes

- For Branched Chain Alkanes
- **Step 1: Look for the longest unbranched chain in the molecule**

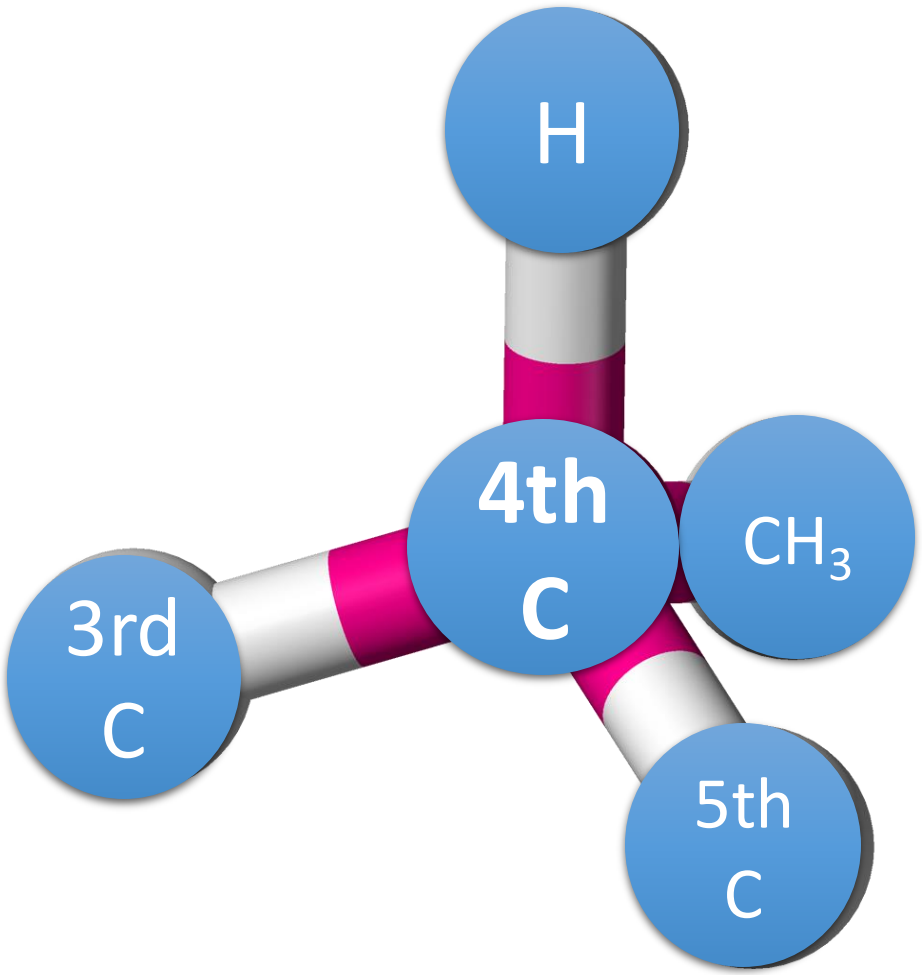


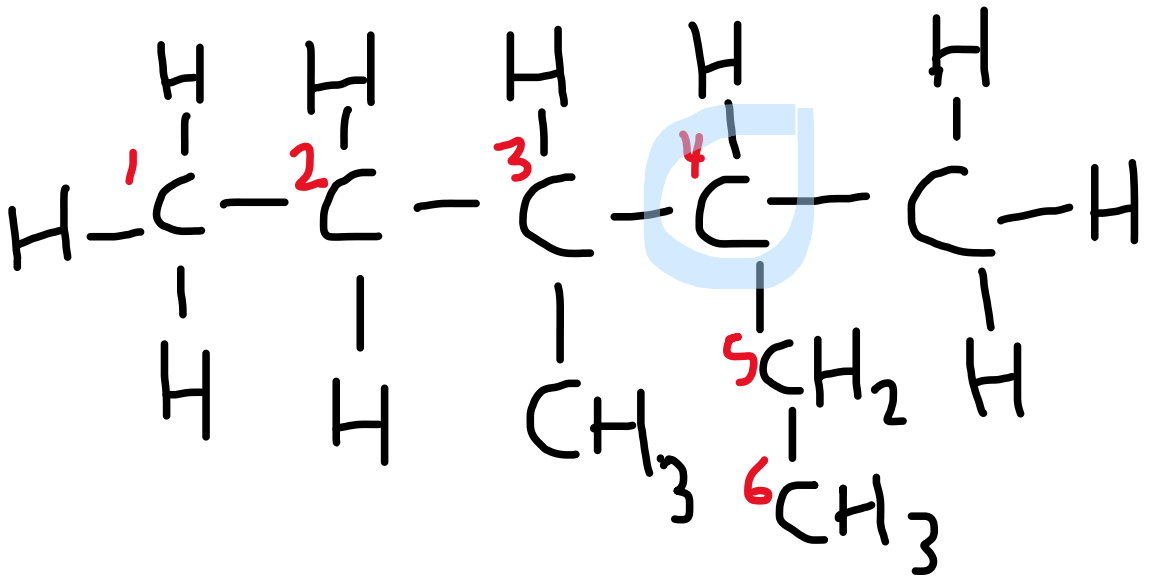
Caution!



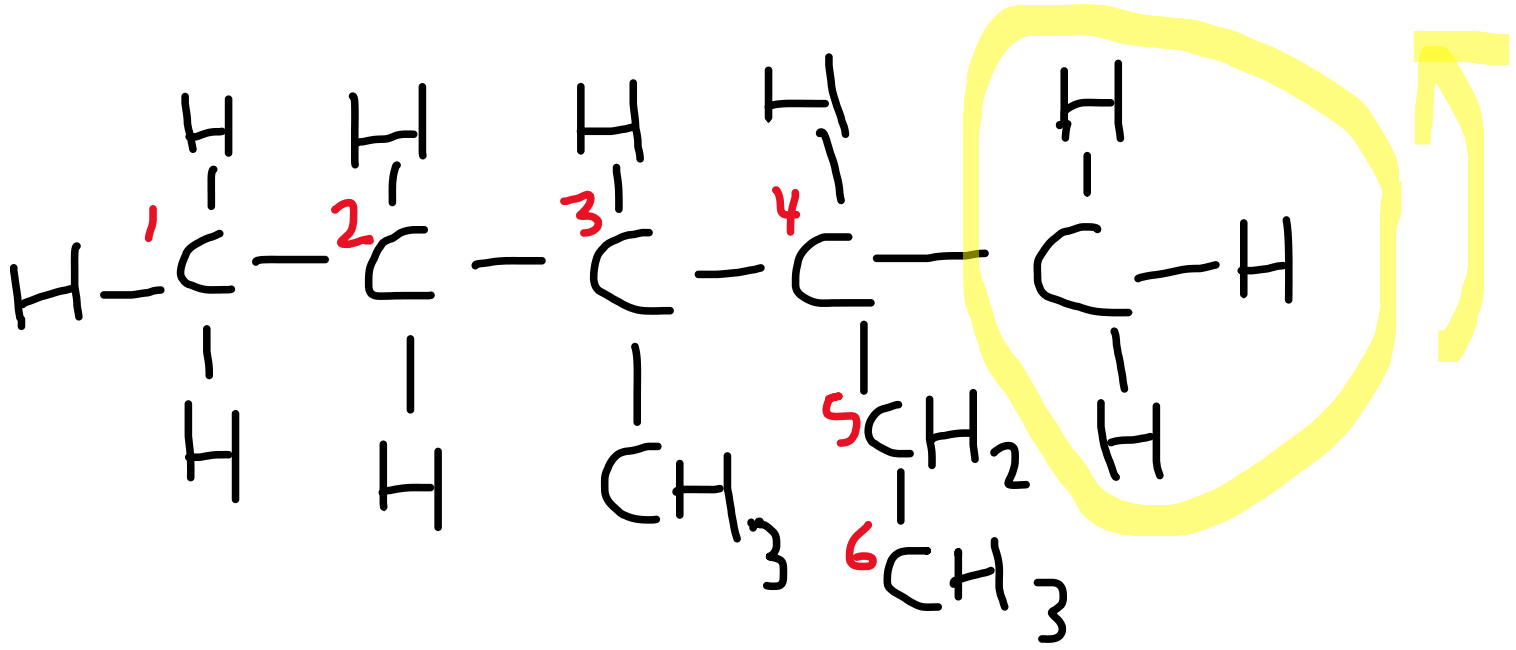
- It is a common mistake to think that the main chain has 5 carbon atoms with one methyl group on the 3rd C and one ethyl group on the 4th C.
- But the chain with 5 carbon atoms is NOT the longest chain!

- 3-D view of the 4th Carbon in the structure

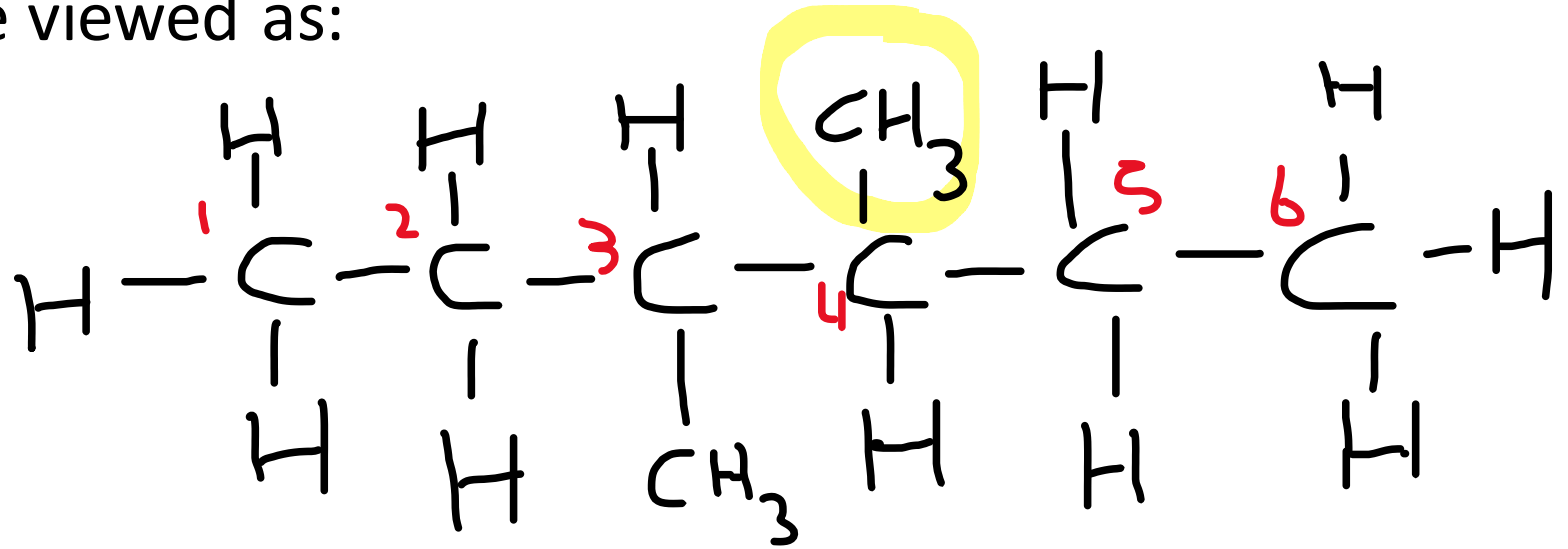




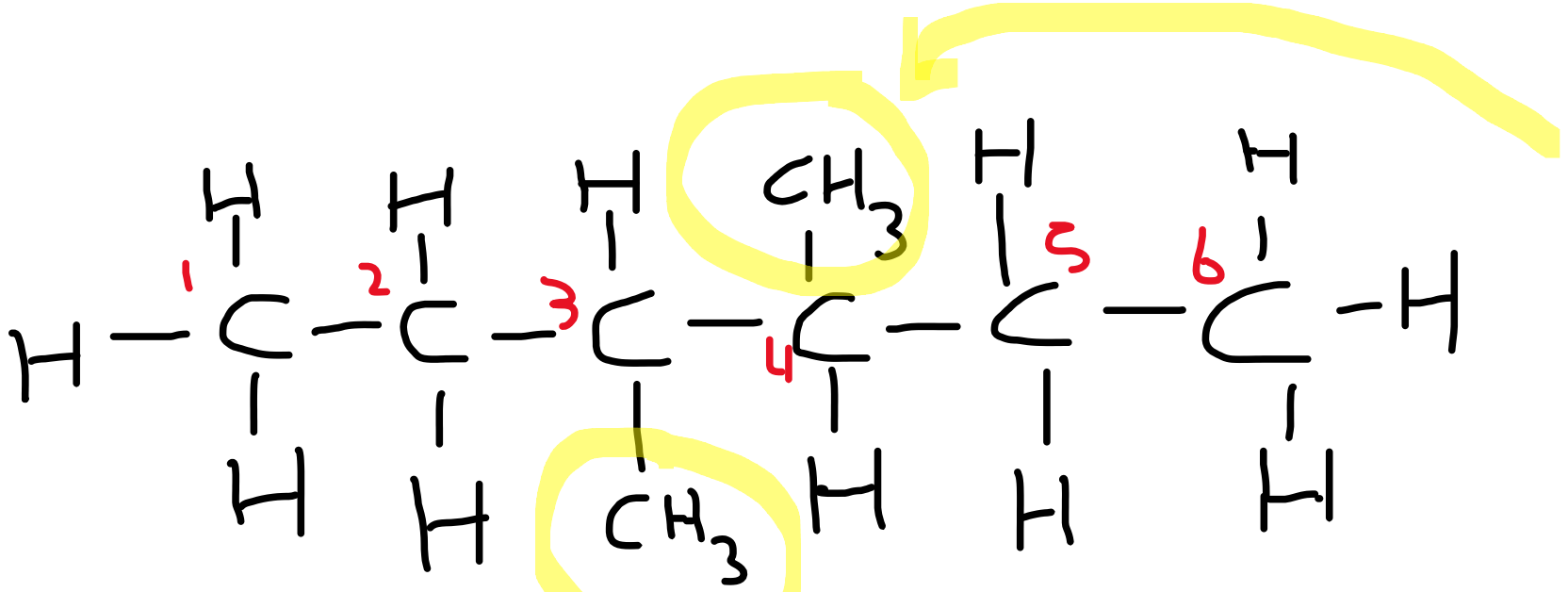
Recall: Bond rotation around each carbon atom



- Note that if we rotate the methyl group on the 4th carbon in the 3-D structural arrangement to straighten out the chain, then the above structure can be viewed as:



- **Step 2: Look for the branches/ side groups attached to the main chain and locate which C atoms they are attached to**

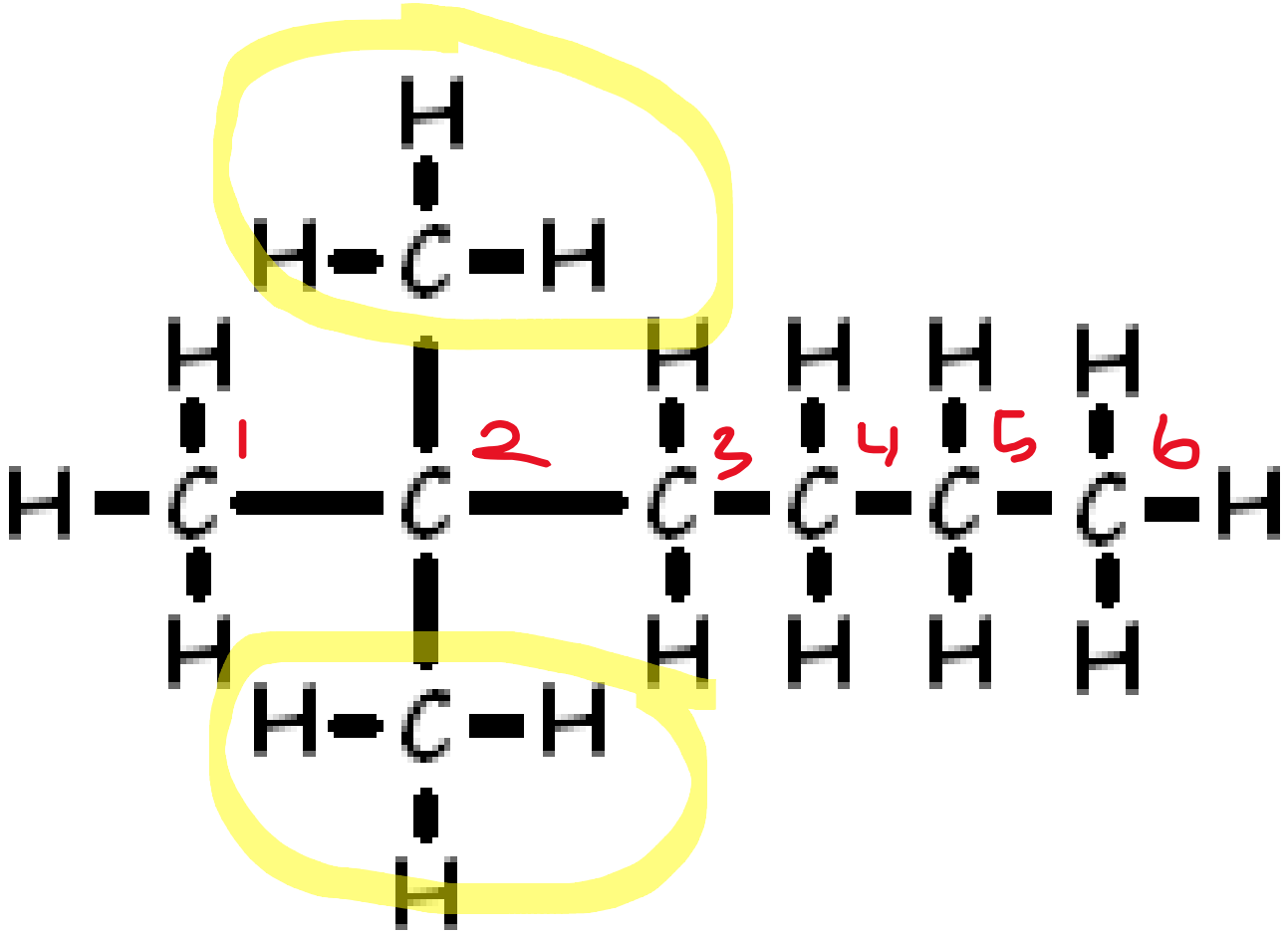


Methyl Group branching off the 4th carbon atom on the main chain

Methyl Group branching off the 3rd carbon atom on the main chain

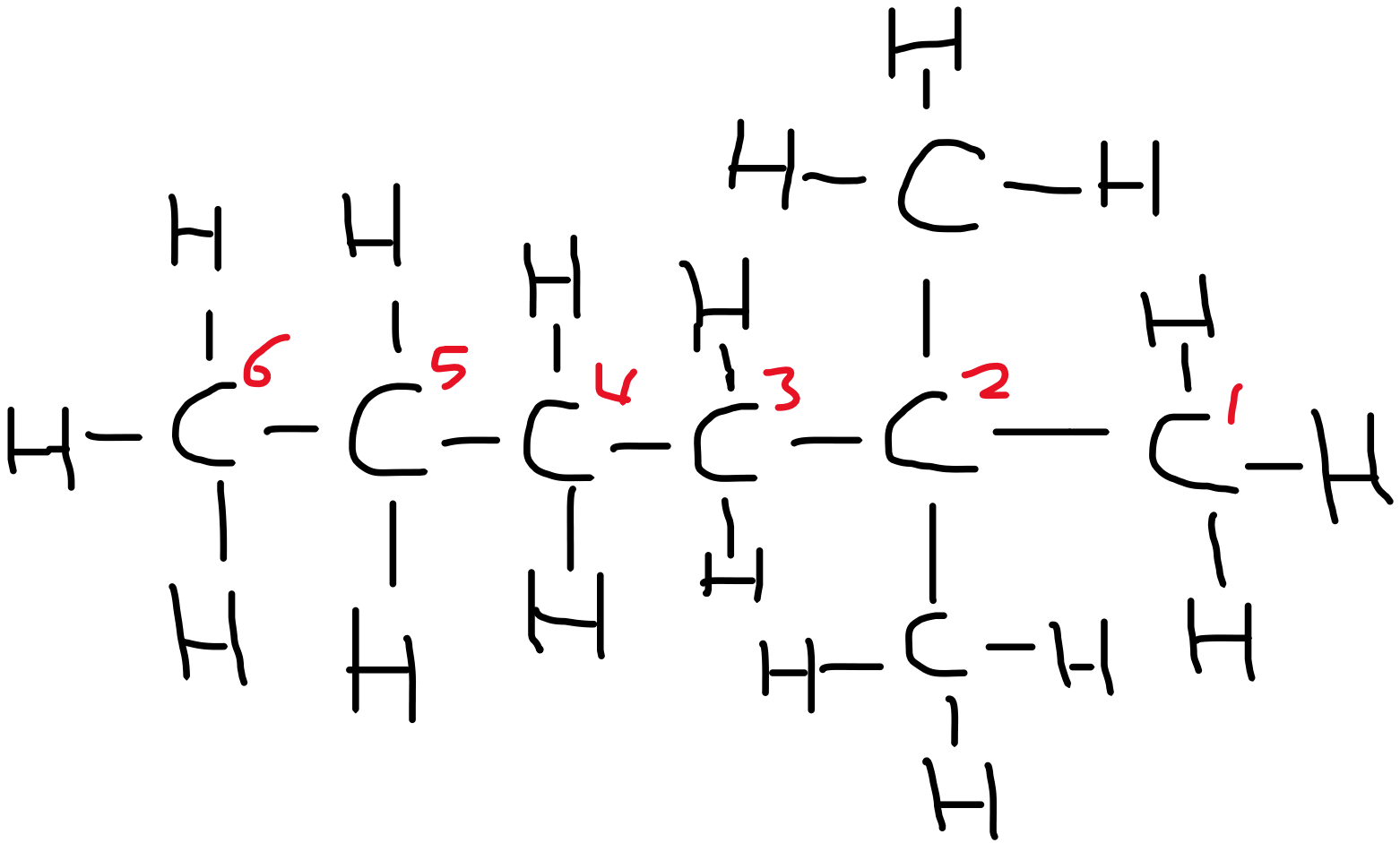
Thus, the name is 3,4-dimethyl hexane

H.W. Activity: 2 – dimethyl hexane



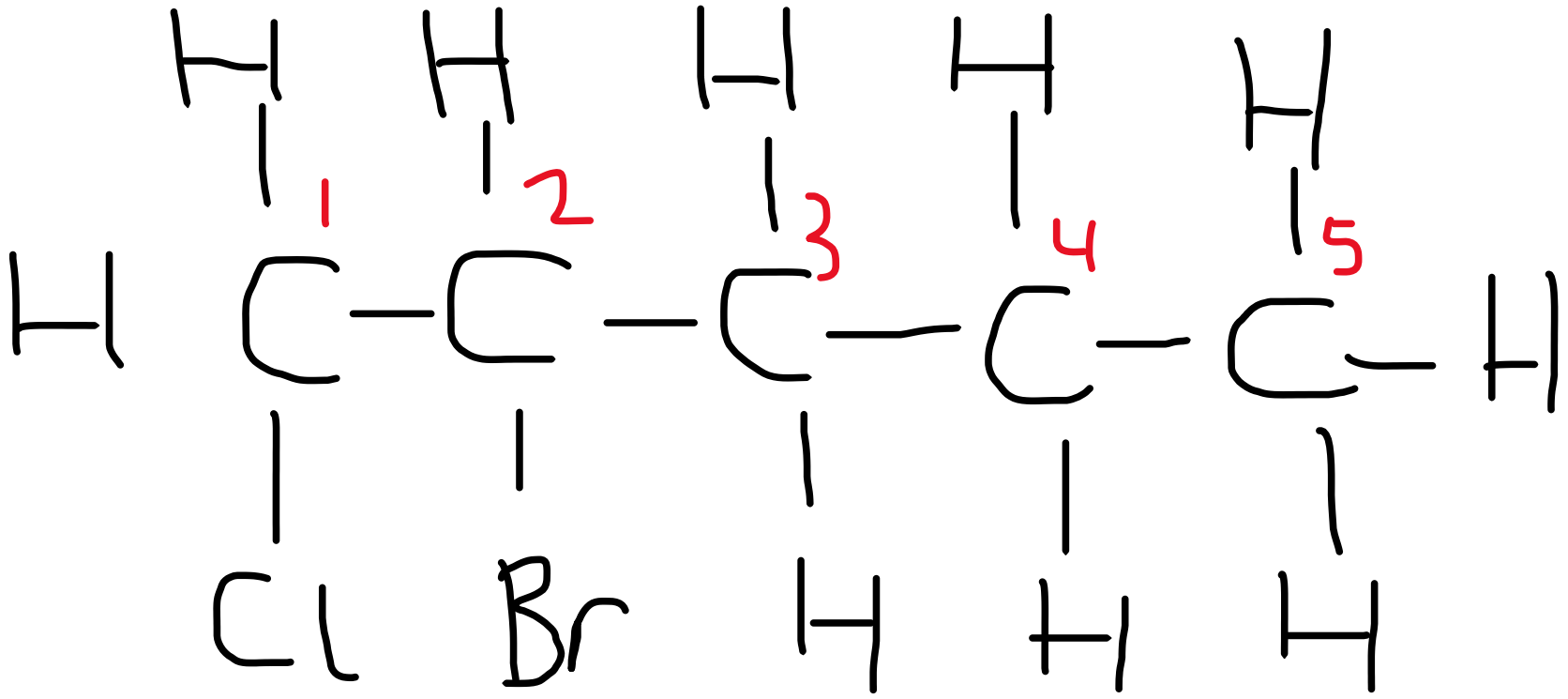
If you are asked in an exam to draw the **structural formula** of an organic compound, you must show ALL BONDS! Therefore you must draw the bonds on the methyl group too!

H.W. Activity: 2 – dimethyl hexane

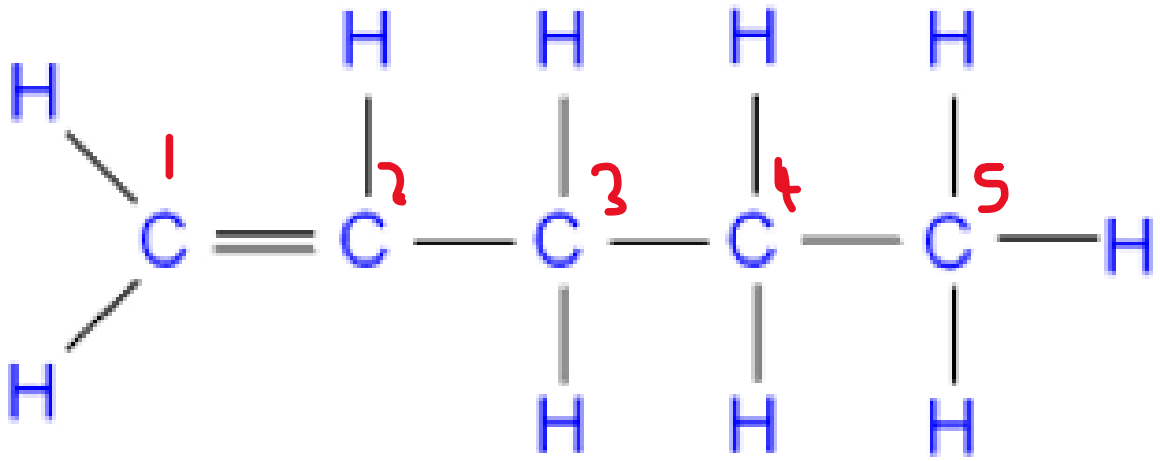


What is the **molecular formula** of this compound?

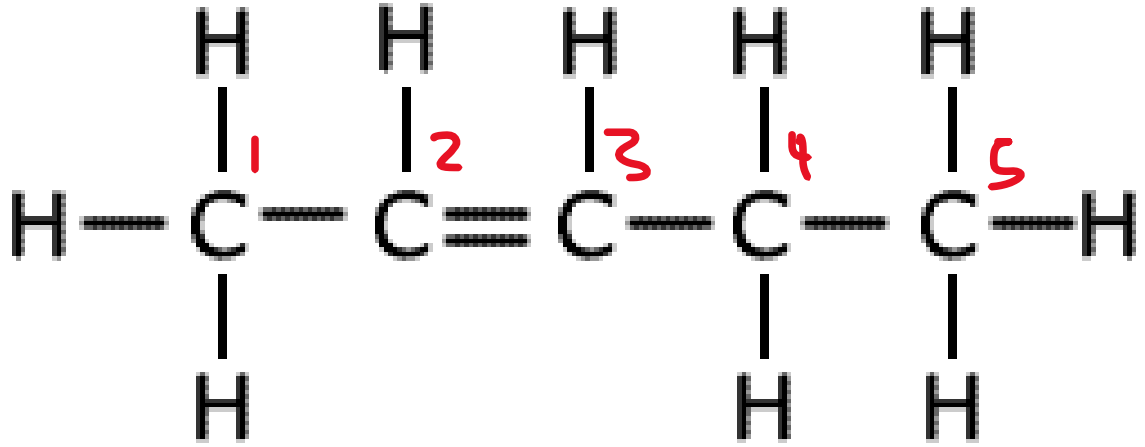
H.W. Activity: 1-chloro,2-bromopentane



Naming Alkenes

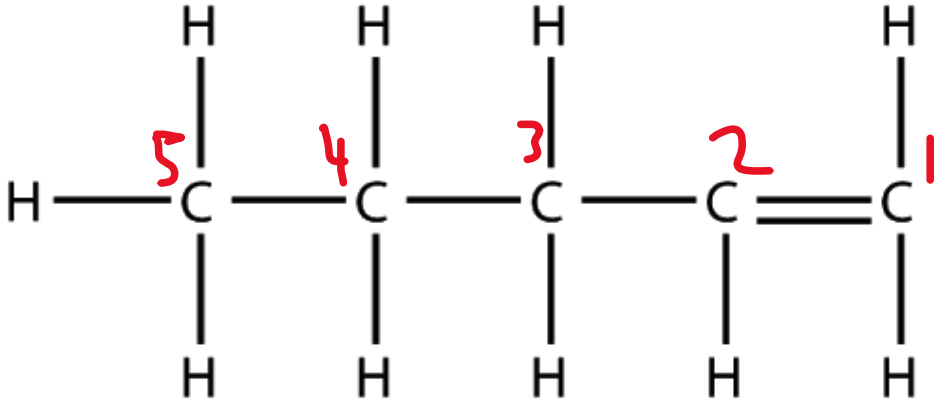


Pent-1-ene

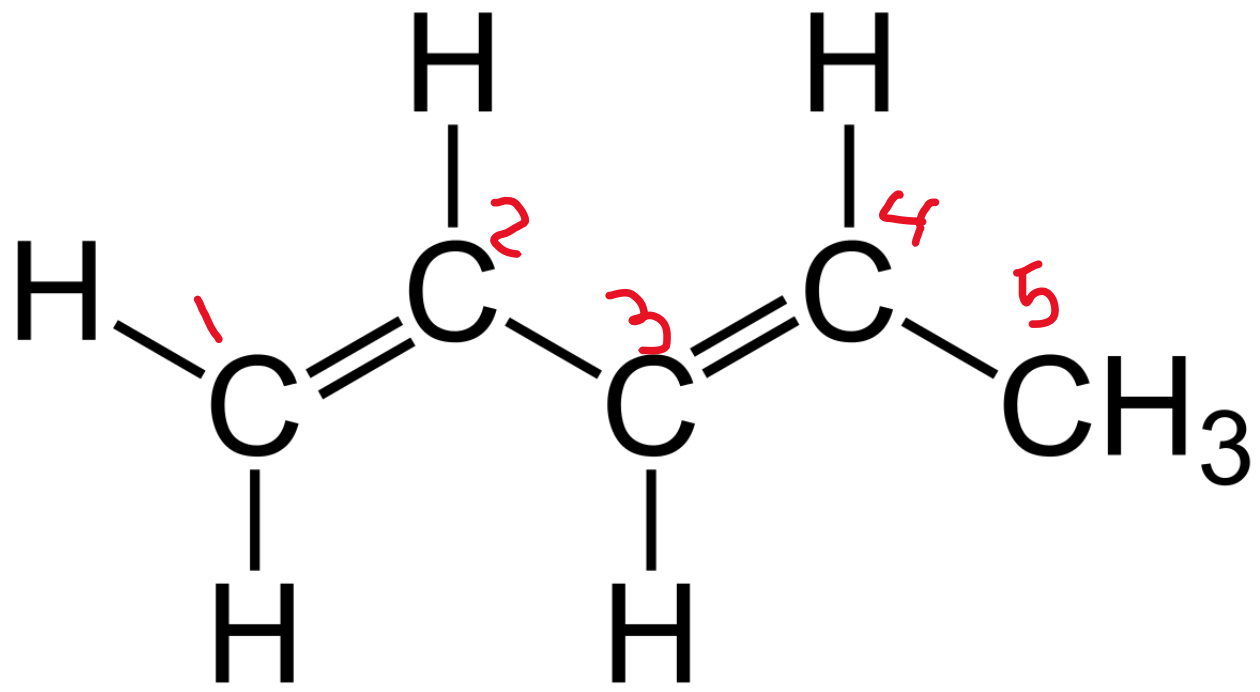


Pent-2-ene

This is also Pent-1-ene Why?



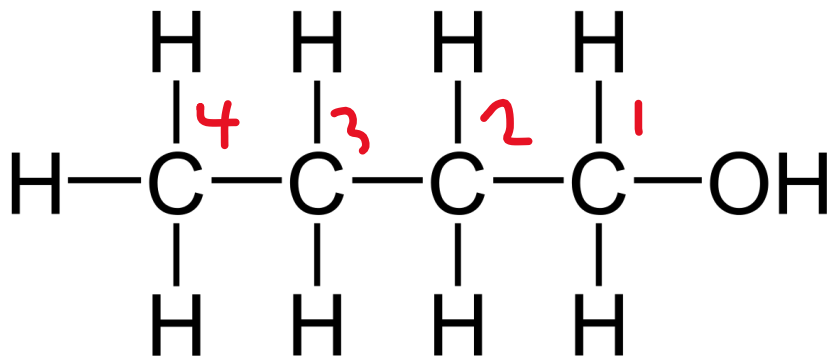
Naming Alkenes



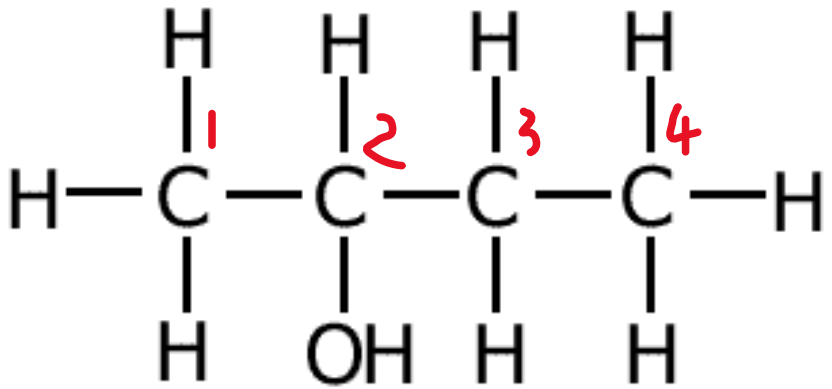
Penta-1,3-diene

Naming Alcohols

- Note the position of the hydroxyl group



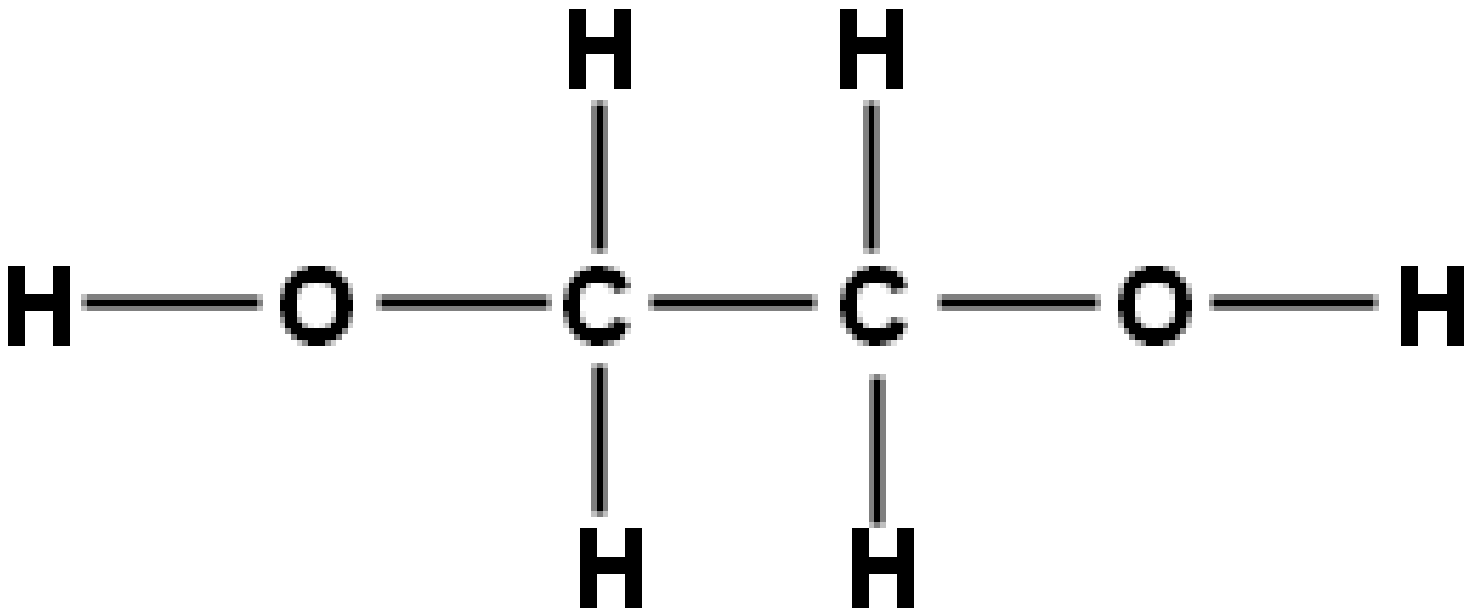
Butan-1-ol



Butan-2-ol

Naming Alcohols

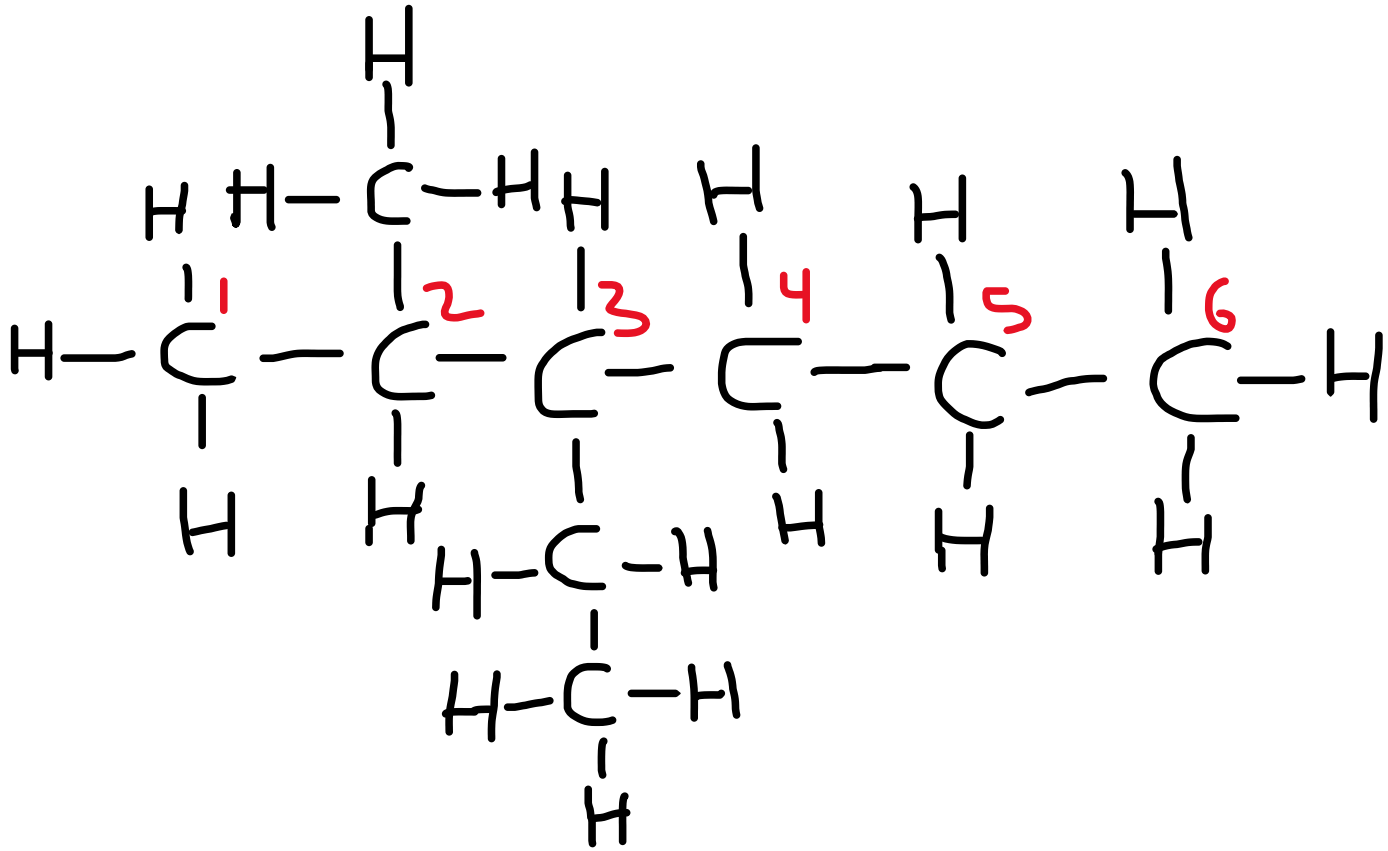
- Note the position of the hydroxyl group



Ethane-1,2-diol

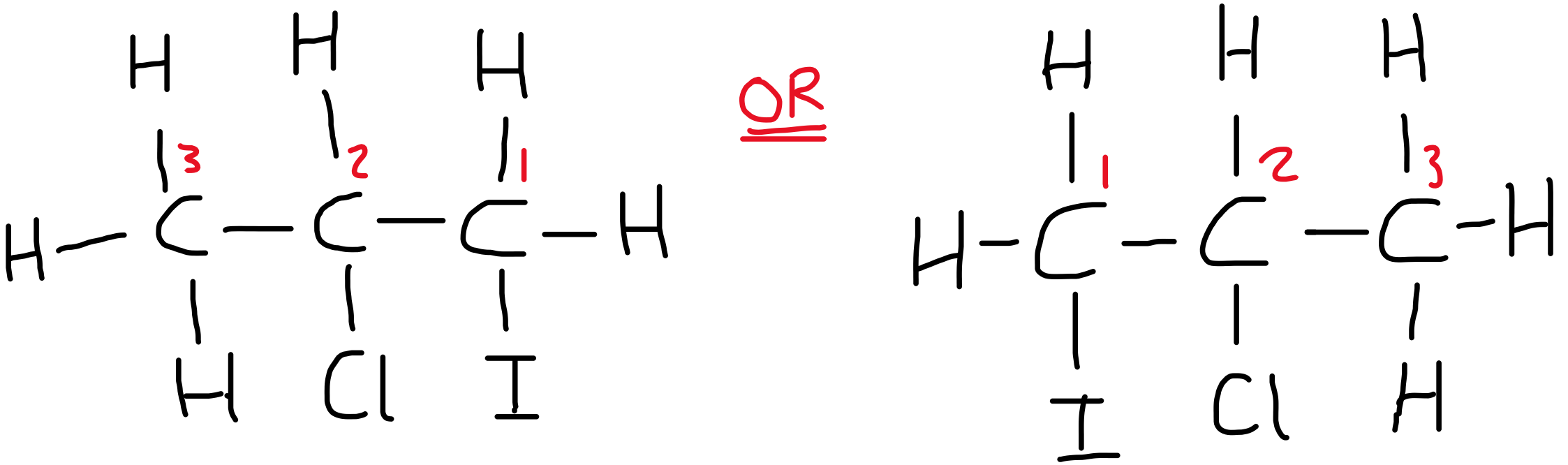
H.W. Correction

- Draw the structure of 3-ethyl-2-methyl hexane



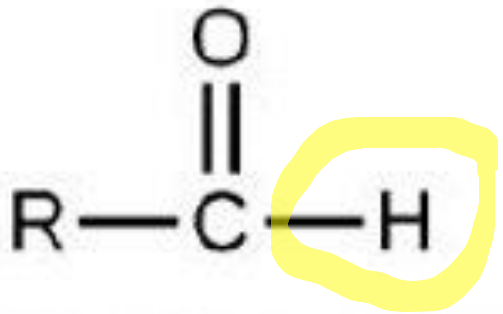
H.W. Correction

- Draw the structure of 2-chloro-1-iodo-propane

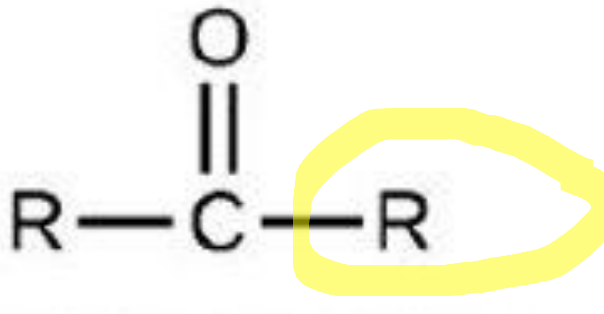


Naming Aldehydes and Ketones

- Recall: The Carbonyl Group



Functional group
of an aldehyde

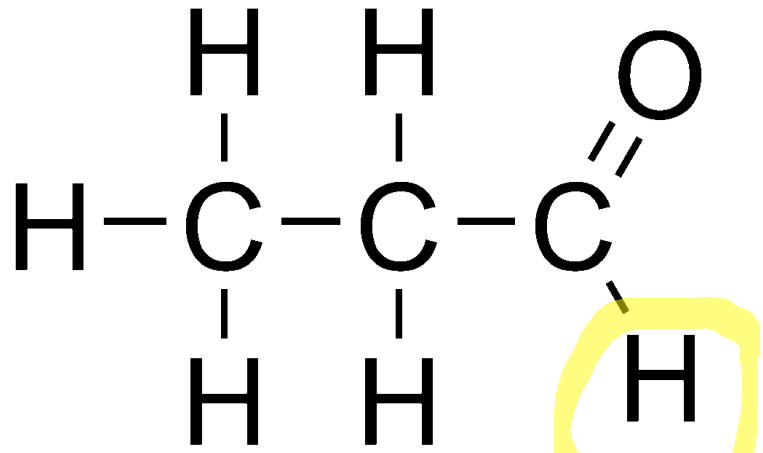


Functional group
of a ketone

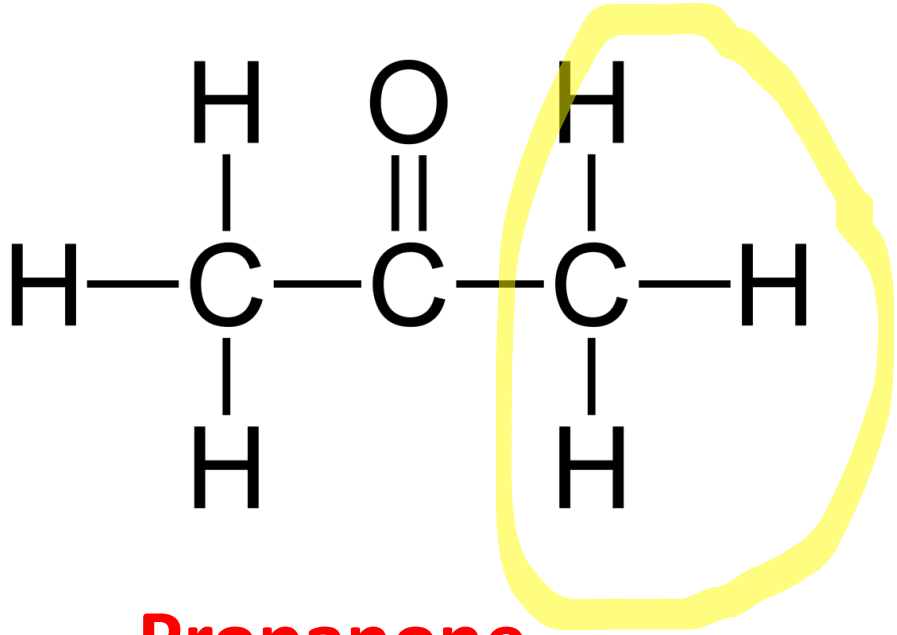
Naming Aldehydes and Ketones

Note that aldehydes and ketones have the same molecular formula but different structural formulae! - ISOMERS!

- Recall: The Carbonyl Group

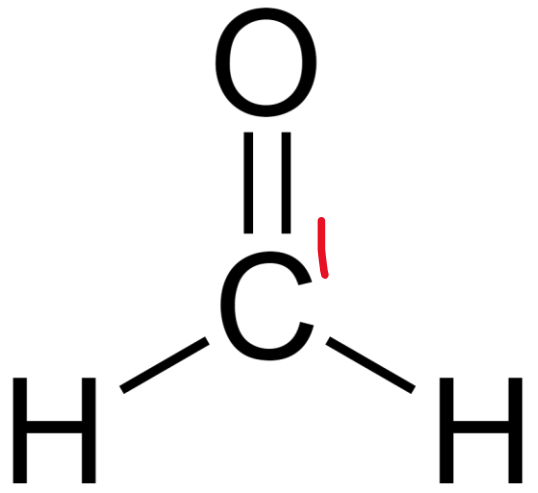


Propanal (Aldehyde)

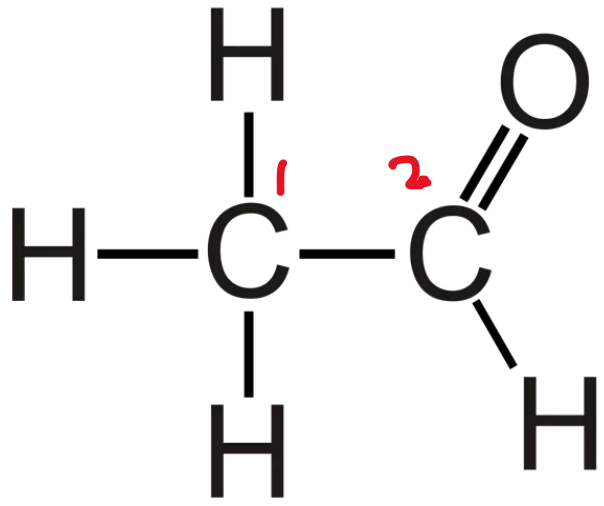


Propanone (Ketone)

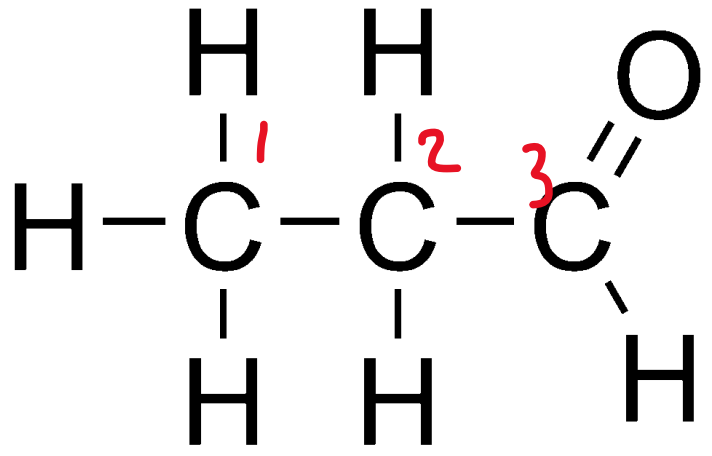
Naming Aldehydes



Methanal (Aldehyde)

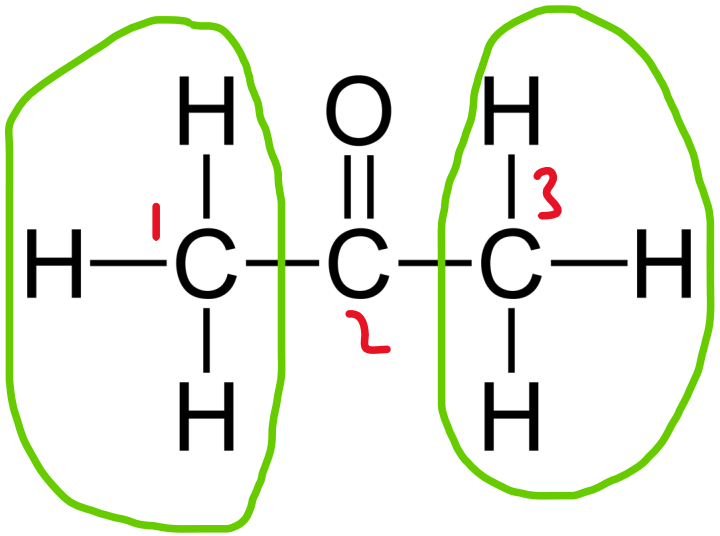


Ethanal (Aldehyde)



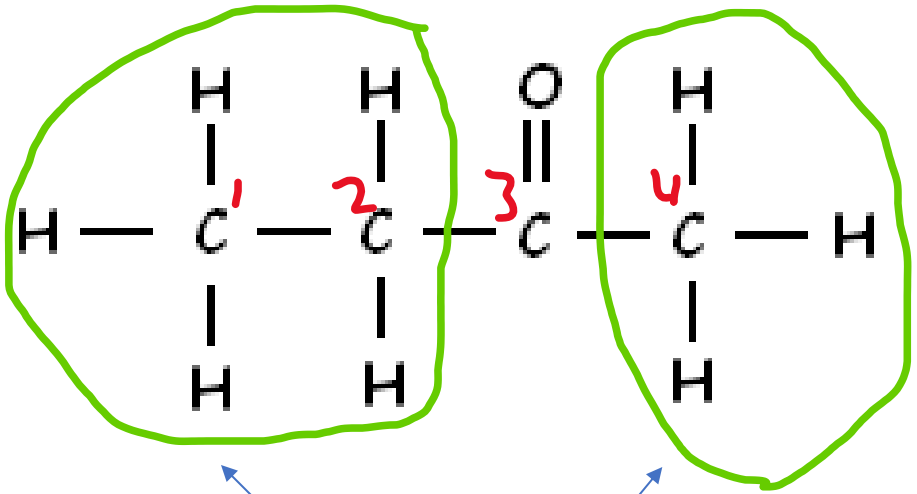
Propanal (Aldehyde)

Naming Ketones



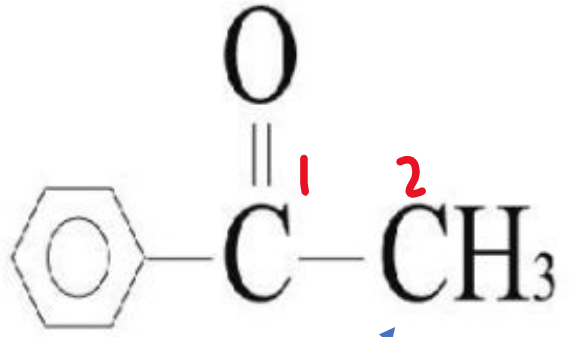
R-groups / Alkyl Groups

Propanone (Ketone)



R-groups / Alkyl Groups

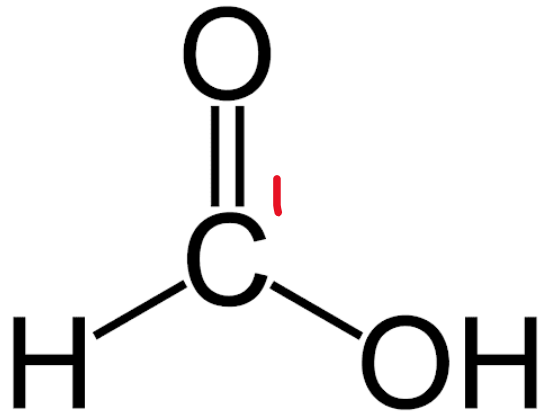
Butanone (Ketone)



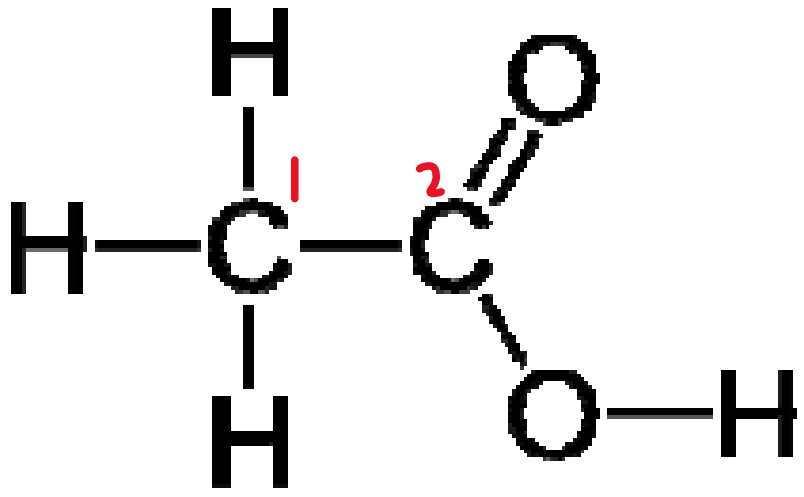
R-groups / Alkyl Groups

Phenyl Ethanone (Ketone)

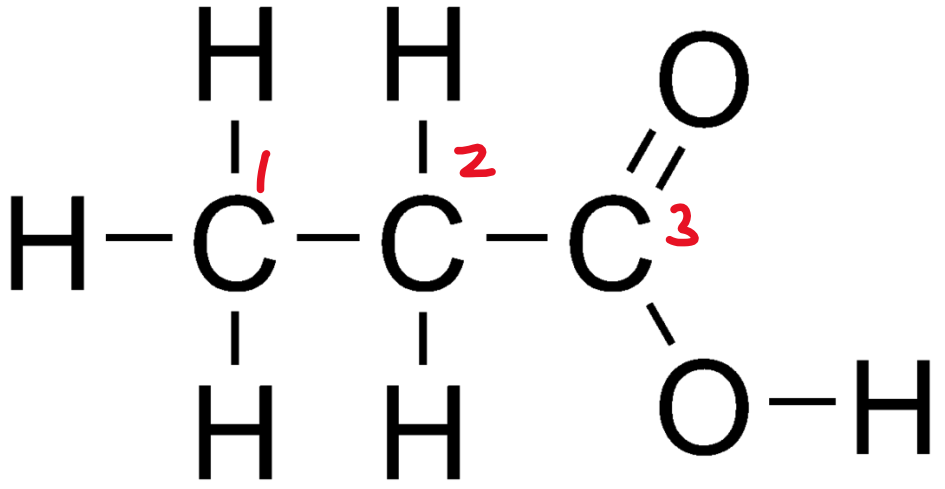
Naming Carboxylic Acids



Methanoic Acid



Ethanoic Acid



Propanoic Acid

Textbook Readings

- Read pages 267 – 272 of the Textbook for naming:
  - Phenols
  - Aromatic Compounds
  - Acid Derivatives
  - Esters
  - Amides
  - Nitriles
  - Amines