

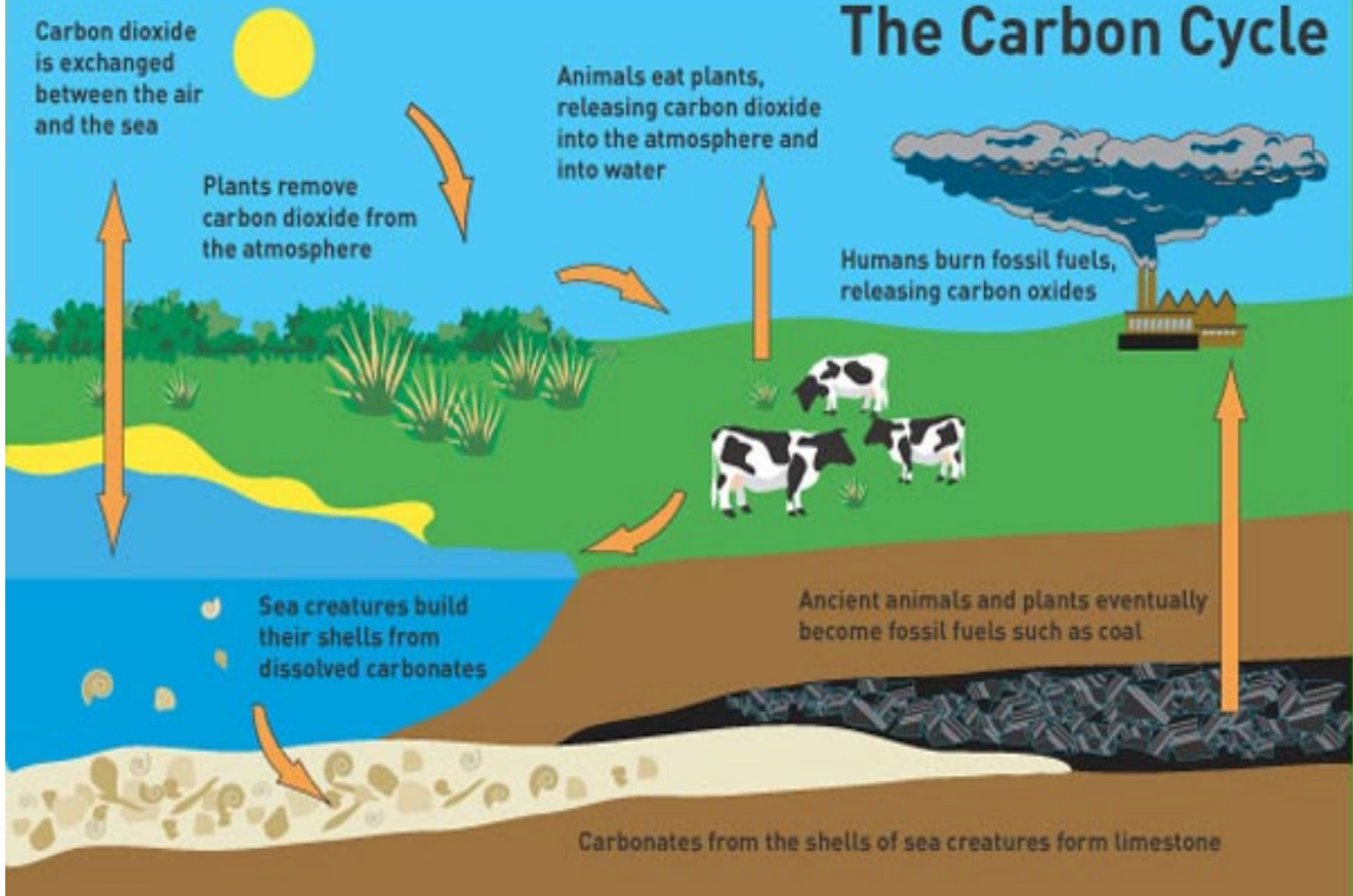
ORGANIC CHEMISTRY

CARBON!!!

- Chemical element C
- Atomic number = 6
- Molar mass = 12.01g/mol
- Non metal
- Tetravalent

- COAL, DIAMONDS, GRAPHITE = carbon!

The Carbon Cycle



Prefix	# of Carbons
Meth	1
Eth	2
Prop	3
But	4
Pent	5
Hex	6
Hept	7
Oct	8
Non	9
Dec	10

Alkanes

ALKANES

- Hydrocarbon compounds
- All carbons are SATURATED (meaning all single bonds)
- Acyclic (meaning no loops)



- i.e. C_7H_{16}

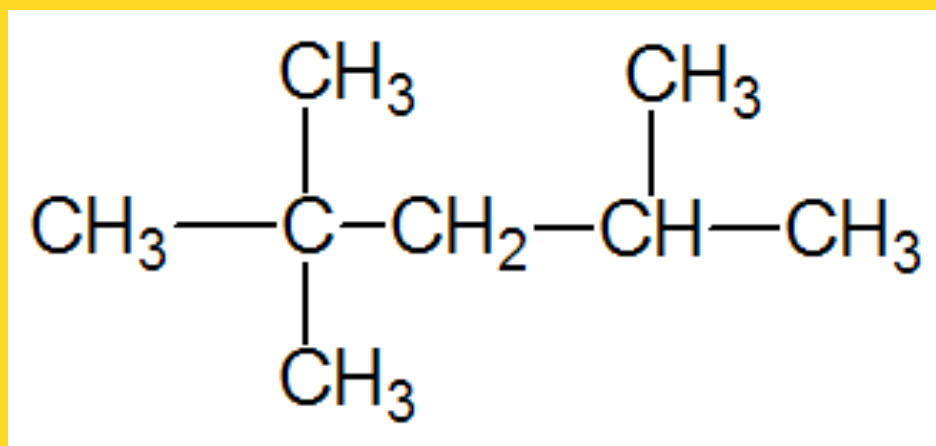
IUPAC Naming

- the root is names using the longest continuous chain of carbon atoms and applying the standard greek name (as per page 9 of the data booklet)
- the suffix “ane” is added to the appropriate numbering

- every side chain is named by subtracting the “ane” and adding “yl” suffix (branches are ending in yl)
- each side chain is numbered by its distance from the first carbon in the chain (so to have the lowest numbers)

Example

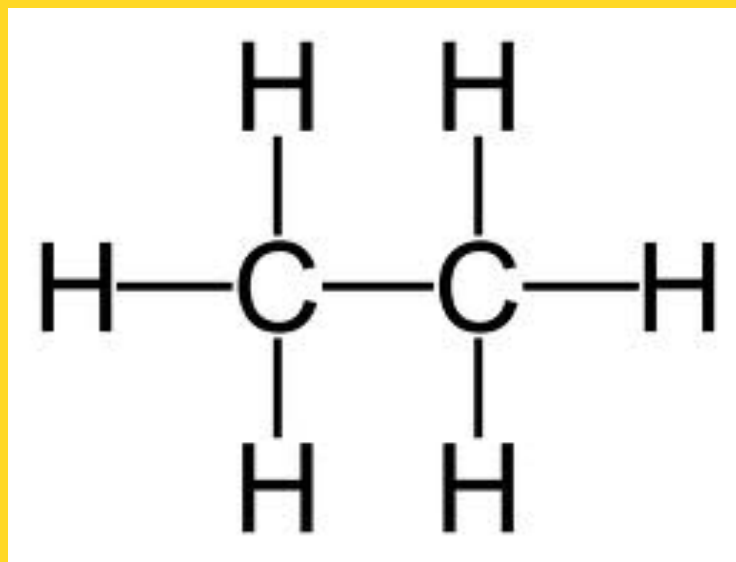
- Name the following alkane



- Longest chain = 5 carbons = pent
- All single bonds = ane
- Branches off the 2,2,4 carbons are all 1 = methyl
- Because there are three of the same branch = tri
- 2,2,4 trimethyl pentane**

Example 2

- Name the following alkane



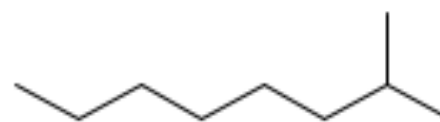
- 2 carbons = eth
- All single bonds = "ane"
- **ethane**

Example 3

- Name the following alkane

- Longest chain = 8 = oct
- All single bonds = ane
- Branch = 1C = methyl
- Branch position = 2

- **2 methyl octane**



Commercial Importance of Alkanes

- Natural gas = mainly methane (also includes ethane, propane, butane and pentane)
- Natural gas is heated in a fractional distillation tower to remove H₂S

- Petroleum = variety of alkanes separated by fractional distillation
- Fuel, wax, lubricants, asphalt, tar and sulfur all come from petroleum
- Pharmaceuticals, fertilizers, pesticides and plastics are manufactured from petroleum

Alkenes

Alkenes

- Aliphatic hydrocarbon molecules with at least one double bond
- Unsaturated bonds: **double bonds** (can turn into single bonds by adding hydrogen)



- i.e. ethene = C₂H₄

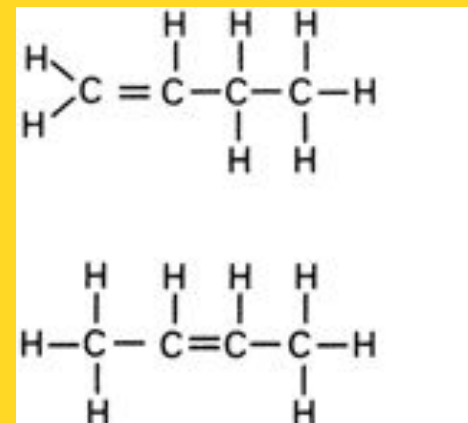
IUPAC Naming

- Find the **longest parent chain** that includes the double bond
- Change the ending of the parent to **ene**

- number the chain so that the double bond has the lowest number
- if there is more than one double bond, use the Greek language prefixes to indicate quantity

Example

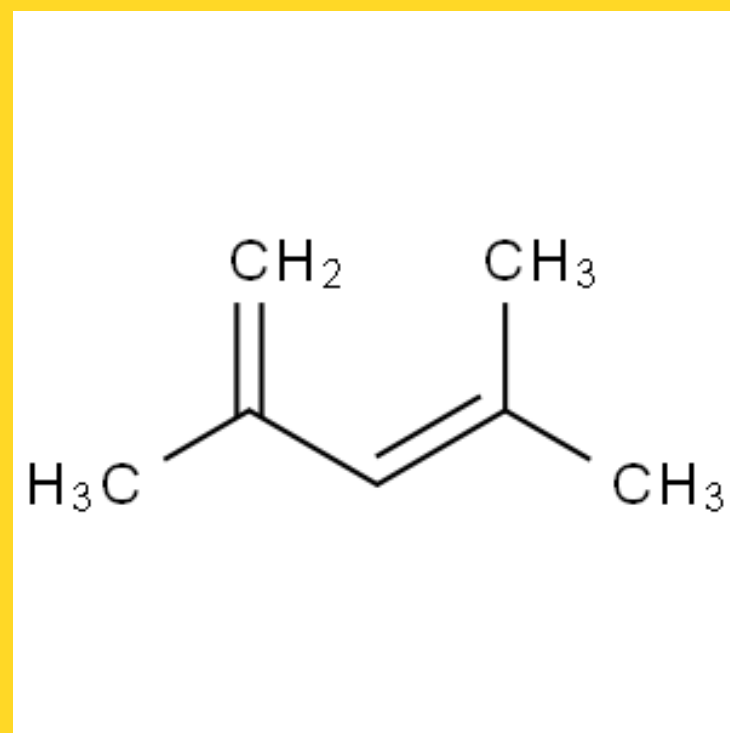
- Name the following alkene:
- Longest chain containing double bond = 4 = but
- Top example has double bond at 1 bond
- But-1-ene
- Bottom example has double bond at 2 bond
- But-2-ene



Example 2

- 2,4-dimethylpenta-1,3-diene

- Root is 5 carbons
- Contains a double bond at 1 & 3
- Off the 2nd and 4th carbon methyl branches
- Methyl = 1 C



Alkynes

Alkynes

- Aliphatic hydrocarbon molecules with at least one triple bond
- The triple bond causes the alkyne to act differently than with a double or single bond



- I.e. C_2H_2

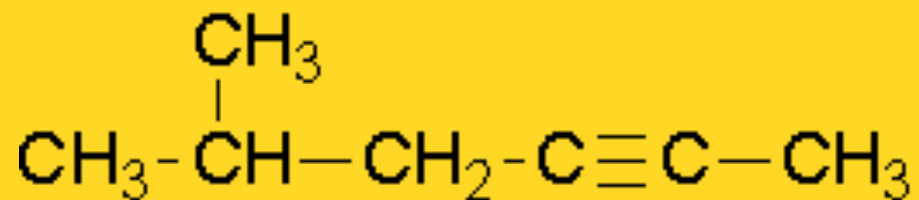
IUPAC Naming

- Find the longest parent chain that includes the triple bond
- Change the ending of the parent to “yne”

- number the chain so that the triple bond has the lowest number
- if there is more than one triple bond, use the Greek language prefixes to indicate quantity

Example

- Name the following alkyne



- Longest chain containing the triple bond = 6C = hex
- Triple bond at the 2nd bond = 2-yne
- Branch containing 1C off the 5C = 5methyl
- 5 methyl hex-2-yne**

Example 2

- Draw a structural diagram to represent buta-1,3-diyne
- But = 4C compound
- Diyne – 2 triple bonds
- At the 1,3 bonds

