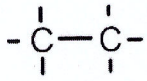
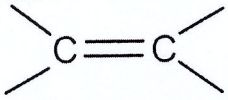
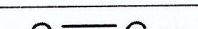
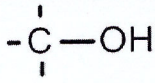
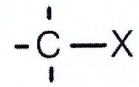
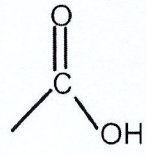
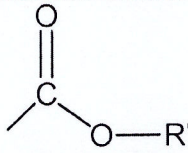
# Summary of Organic Compounds

## Summary of Organic Compounds Classified by Functional Group

$C_nH_{(2n+2)}$ ie. $C_6H_{14}$ →

$C_nH_{(2n)}$ → ie. $C_3H_6$

$C_nH_{(2n-2)}$ ie. $C_4H_6$

| Functional Group | Name | Suffix |
|---|---|---|
|  | alkane | -ane |
|  | alkene | -ene |
|  | alkyne | -yne |
|  | alcohol | -ol |
|  where X is a halogen | alkyl halide | -ane (alkyl halides are alkanes) |
|  | carboxylic acid | -oic acid |
|  where R' is any hydrocarbon other than hydrogen | ester | -oate |

* also know:
- aliphatic vs aromatic
- saturated vs. unsaturated

## Summary of Organic Compounds Based on Boiling Points

| Compound | Boiling Point (°C) |
|---|---|
| alkenes | lowest |
| alkane | ↑ |
| alkyne | ↑ |
| ester | ↑ |
| alcohol | ↑ |
| carboxylic acid | highest |

* memorize!

***table based on organic molecules with the same amount of carbon atoms***

- Boiling points of simple cyclic compounds are similar to those of aliphatic hydrocarbons having the same number of carbons

↗ ie. homogolous series

* When comparing organic compounds within the same functional group, the longer the hydrocarbon chain, the greater the boiling point (due to more London Dispersion forces)

**BOILING POINTS OF ORGANIC MOLECULES IN A HOMOLOGOUS SERIES**

# of carbons ↓ increases

| Alkanes | Boiling Point (°C) | Alkenes | Boiling Point (°C) | Alkynes | Boiling Point (°C) |
|---|---|---|---|---|---|
| ethane | -89 | ethene | -104 | ethyne | -84 |
| propane | -42 | propene | -47 | propyne | -23 |
| butane | -0.5 | butene | -6.3 | butyne | 8.1 |
| pentane | 36 | pentene | 30 | pentyne | 39 |
| hexane | 69 | hexene | 63 | hexyne | 71 |

↑ homogolous series

↑ another homologous series

↑ another homologous series

boiling point ↓ increases

- When comparing properties of organic molecules to other organic molecules, it is sometimes useful to compare molecules that contain the same functional group.
  - * A **homologous series** is a group of molecules that have the same general formula (ie. have the same functional group), but only differ from one another in the length of the carbon chain.
  - An example of a homologous series would be $CH_3(COOH)$, $C_2H_5(COOH)$, $C_3H_7(COOH)$, and $C_4H_9(COOH)$, $C_5H_{11}(COOH)$
  - Another example would be $CH_4$, $C_2H_6$, $C_3H_8$, and $C_4H_{10}$, $C_5H_{12}$

**SUMMARY OF THE SOLUBILITY OF ORGANIC COMPOUNDS**

| Compound | Soluble in Water | Polar or non-polar |
|---|---|---|
| alkenes | No | Non-polar |
| alkane | No | Non-polar |
| alkyne | No | Non-polar |
| ester | Yes, if 4 carbons or less | Somewhat polar |
| alcohol | Yes | Polar |
| carboxylic acid | Yes | Polar |

* memorize!

- When comparing organic compounds within the same functional group, the longer the hydrocarbon chain, the less soluble in water the molecule becomes.

*****Now try pg. 584 #8, 14, 15, 18, 19, 22*****