CH 23 Organic Compounds

I. Simple Organic Compounds

A. All *organic compounds* - contain carbon

1, make up 90% of all compounds

B. Bonding- many types lead to many organic compounds

1. Carbon bonds to itself in several ways

a) Single, double, or triple covalent bonds

b) Forms straight chains ex)

c) Forms branched chains ex)

d) Forms rings ex)

2. Each carbon must have 4 bonds

C. 2 types of formulas:

1. Molecular formulas- regular formulas ex) CH4

2. Structural formula- drawing of compound showing each elements, each bond, and general shape of molecule

Ex) CH4 drawn as:

a) isomers- molecules with same molecular formula, but different structural formulas ex) C4H10

1) Isomers have different properties

D. Hydrocarbons- molecules of only carbon and hydrogen

1. Naming – use prefix that matches number of carbon in molecules (table 1 p 708)

a) meth-1, eth-2, prop-3, but-4, pent-5, hex-6, hept-7, oct-8, non-9, dec-10

b) More carbons higher BP

2. Suffix tells type of bonding in molecule

a) Saturated hydrocarbons have all single bonds- called alkanes

1) End with suffix ( –ane) ex) C2H6 is ethane

2) General formula: Cn H2n + 2

a. ‘n’ stands for number of carbon atoms in formulas

Ex) what is the molecular formula for octane?

b) Unsaturated Hydrocarbons- contain at least one double or triple bond

1) Alkenes- contain at least one double bond

a. suffix ( -ene) ex) C2H4 is ethane

b. general formula: Cn H2n

Ex) what is the molecular formula for pentene?

2) Alkynes- contain at least one triple bond

a. suffix ( -yne) ex) CH2 is ethane

b. general formula: CnH2-n

Ex) what is the molecular formula for propyne?

II. Other Organic Compounds

B. *substituted Hydrocarbons*- some other element or group is in place of at least one hydrogen

1. *Alcohols*- hydroxide (-OH) group replaces hydrogen

2. *Organic Acids*- have (-COOH in place of a hydrogen

Ex) C2H5OOH- ethanoic acid or vinegar

3. Halogenated Hydrocarbons- a member of halogen family replaces hydrogen

Ex) CH3Br- methyl bromide- a pesticide

4. Esters – have a (-COOC-) group somewhere in the middle of the molecule

a. used in artificial flavors

ex CH3COOC5H11

5. amines contain an (-NH2) group

a. in many proteins and making die

B. Aromatic Compounds- contain a benzene ring C6H6:

1. Structural formula- alternate single and double bonds bet, carbons (draw)

2. Most are fragrant- used in perfumes and artificial flavors

C. Petroleum Products- thousands of compounds separated by distillation from crude oil

1. distillation- separated liquids by boiling point- collection and recondencing vapors

2. Less carbon in molecules = lower molecular mass and lower boiling point

a. methane to propane are gas phase at room temp

3. lighter compounds used as fuels ex) gasoline

D. Polymers- long repeating chains of monomers (plastics)

1. monomers- link in the chain – made of a short organic compound

2. makes plastics Styrofoam, and fabrics like polyester

a. becoming an environmental problem

E. biological Compounds

1. *lipids*- fats and biological oils

2. DNA – made of *nucleic acids* – carry genes for heredity

3. *Carbohydrates ­* Sugars and Starches

4. Medicines

5*. Proteins* - muscles