

Lesson 41: Organic I

text: 931-940

what to know:

- structure, nomenclature and properties of various alkanes and their alkyl groups, §24-1
- concept of structural isomers, §24-1
- chemistry of petroleum, §24-1
- alkenes, alkynes, cycloalkanes and aromatic hydrocarbons, §24-1

questions:

1. Why are hydrocarbons nonpolar molecular substances? Why do alkanes normally have relatively low boiling points? Why are alkanes so chemically inert?
2. Organic compounds always contain carbon but often contain hydrogen, oxygen, nitrogen or a halogen. In each case, state the number of covalent bonds each can exhibit and show the various possible arrangements (single, double and triple bonds).
3. Write structural and abbreviated formulas for the following.
 - a. 2-methylhexane
 - b. 2,2-dimethylbutane
 - c. 3-ethylpentane
 - d. 2,3,4-trimethylheptane
4. Draw and name all:
 - a. five structural isomers with the formula, C_6H_{14} .
 - b. nine structural isomers with the formula, C_7H_{16} .
5. Which has the lowest octane rating? hexane, 2,3-dimethylhexane, 2,2,4-trimethylpentane, toluene
6. What are the products of the fractional distillation of petroleum crude oil?
7. Write the balanced equation showing the complete combustion of heptane.
8. Illustrate what is meant by the term unsaturated?
9. Write structural formulas for the following:
 - a. trans-2-butene
 - b. 5,5-diethyl-3-propyl-1-octene
 - c. 3-heptyne
 - d. m-dibromobenzene
 - e. 2,4-dimethyl-1-ethylbenzene
 - f. 3-phenylbutyne
 - g. 2,4,6-trinitrotoluene (1-methyl-2,4,6-trinitro-benzene)
10. Show the structures of compounds formed when the following are added to propene.
 - a. H_2
 - b. H_2O
 - c. HCl
 - d. NH_3
 - e. Br_2
11. What happens when soybean oil is hydrogenated?