Answers to Q 1-8
Organic Lesson 1

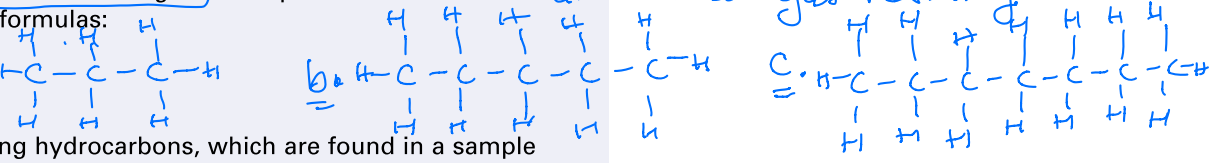
Section 11.1 Questions

Understanding Concepts

1. Classify each of the following compounds as inorganic or organic:
   (a) $CaCO_{3(s)}$ inorganic
   (b) $C_6H_{6(l)}$ organic
   (c) $CO_{2(g)}$ inorganic
   (d) $C_4H_{10(g)}$ organic
   (e) $CH_3(CH_2)_6CH_{3(l)}$ organic

"fossil" fuels → animal + plant material that have been subjected to "heat & pressure"

2. What is believed to be the origin of most hydrocarbons on Earth?
3. Identify the sources of most organic compounds. → 1. physical separation from petroleum + natural gas
   2. oil and gas refining
4. List three common fuels that are hydrocarbon compounds.
   coal, gasoline, oil
5. Draw a complete structural diagram to explain each of the following empirical formulas:
   (a) $C_3H_{8(g)}$
   (b) $C_5H_{12(l)}$
   (c) $C_7H_{16(l)}$



6. Name the following hydrocarbons, which are found in a sample of crude oil:
   (a) $C_2H_{6(g)}$ ethane
   (b) $C_4H_{10(g)}$ butane
   (c) $C_6H_{14(l)}$ hexane
   (d) $C_9H_{20(l)}$ nonane

C_nH_{2n+2} ← generic formula for an ALKANE

7. Can the hydrocarbon $C_{45}H_{92(s)}$ be classified as an alkane? Justify your answer.

$n = 45$ ∴ $C_{45}H_{92}$ is an alkane
$2n+2 = 92$

Applying Inquiry Skills

8. Complete the Analysis section of the following lab report.

Question

What is the chemical formula, molecular structure, and name of an unknown gas?

Experimental Design

A sample of a gas is analyzed with a combustion analyzer and a mass spectrometer.

Evidence

percent by mass of carbon = 81.68%
percent by mass of hydrogen = 18.32%
molar mass by analysis = 44.01 g/mol

$81.68\,g\,C\left(\frac{1\,mol}{12.0\,g}\right) = 6.81\,mol\,C \div 6.81 = 1$
$18.32\,g\,H\left(\frac{1\,mol}{1.0\,g}\right) = 18.3\,mol\,H \div 6.81 = 2.69 \approx 3$

$= \frac{2}{3} = 0.\overline{6}$

$= 8$

Analysis

C_3H_8 + C_3H_8

(a) Determine the empirical molecular formula of the hydrocarbon, name it, and draw a structural diagram.

propane

∴ C_3H_8

E.F. = 3C = 36.0
8H = 8.0
44.0 g

∴ E.F = M.F = C_3H_8

Making Connections

9. Are fossil fuels a finite source of hydrocarbons? Provide your reasoning.

Reflecting

10. What will we use for an energy source and raw material for making plastics, fabric, detergents, and so on if sources of fossil fuels are depleted?