

Unit 3, Section A: Petroleum: What Is It?

What are important chemical and physical properties of hydrocarbons?

Objectives:

- Describe the chemical makeup of petroleum and how it is refined
- Describe and give examples of two primary uses for petroleum (energy source and raw materials for synthesizing new substances).
- Describe the use of distillation as a separation technique.
- Describe fractional distillation and its application to petroleum refining.
- Describe electron arrangements between covalently bonded atoms.
- Represent covalent bonding in selected hydrocarbons with electron-dot, structural, and molecular formulas.
- Identify and write formulas for alkanes.
- Define *isomer* and draw structural formulas for possible isomers of a particular hydrocarbon.
- Predict and explain relative boiling points of hydrocarbons in terms of their intermolecular forces.

Vocabulary/Terms Introduced: *Define and draw a visual representation of each term as assigned*

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|----------------------------|----------------------------|------------------------|------------------------------|
| • Petroleum | • Fractional Distillation | • Carbon chain | • Skeletal Formula |
| • Crude oil | • Light distillates | • Shells | • Condensed formula |
| • Hydrocarbons | • Intermediate distillates | • Energy levels | • Alkane |
| • Petroleum-based products | • Heavy distillates | • Valence electrons | • Straight-chain alkanes |
| • Distillation | • Residues | • Covalent bonds | • Branched-chain alkanes |
| • Distillate | • Intermolecular forces | • Lewis dot structures | • Isomers-structural isomers |
| • Fractions | • Organic chemistry | • Molecular formula | |

Demonstrations: A.2—Separation by Distillation, Fractional distillation

In Class Projects: A.5—Hydrocarbon Boiling Points, A.8—Trends in Alkane Boiling Points, A.10—BPs of Alkane Isomers

Labs/Lab Activities: A.7—Modeling Alkanes, A.9—Alkanes Revisited

Student Assessments: Vocabulary Quiz, Basic Hydrocarbons: (write and draw) Quiz, Unit 3A Exam

Reading Notes, Terms, Questions and Activities Assigned:

- **A.1—What is Petroleum— HW:** Read pg 212-215, Complete Reading Notes, identify/define vocabulary: Petroleum, Crude oil, Hydrocarbons, Petroleum-based products, Do Section A Summary Questions pg. 233 #1-11.
- **In Class: A.2 Separation by Distillation—** Read pp. 215-218. After Demo—Complete Data Analysis, Plot data and answer Questions 1-6 pg. 217-218 and define: distillation, distillate. **HW:** Complete Summary Questions #12-15 p. 234.
- **A.3-A.4—Petroleum Refining and Examining Petroleum's Molecules** pg. 218-220— **HW:** Complete Reading Notes, identify/define vocabulary: fractions, fractional distillation, light distillates, intermediate distillates, heavy distillates, residues, intermolecular forces, Summary Questions #16-20 pg. 234.
- **In Class: A.5—Hydrocarbon Boiling Points—**Read p 220. Answer Questions 1-6. **HW:** Do Summary Questions #21-23 p. 234.
- **A.6—Chemical Bonding—**Read pp. 220-224. Complete Reading Notes, identify/define vocabulary: Organic chemistry, Carbon chain, shells, Energy levels, Valence electrons, Covalent bonds, Lewis Dot Structures, Molecular formula, skeletal formula, condensed formula. Do Summary Questions #24-28 p. 234
- **In Class: A.7—Modeling Alkanes—**Read pp. 224 and complete the Model chart provided. Do Questions #6-10 p. 228. **HW:** Identify/define bolded vocabulary: alkane, straight-chain alkanes, branched chain alkanes, Summary Questions #29-32, pg. 235.
- **In Class: A.8—Trends in Alkane Boiling Points—**Demo/discussion, **A.9—Alkanes Revisited—**Student Modeling pp. 229-230, making isomers. **HW:** Identify/define vocabulary: isomers and structural isomers, Do Summary Questions #33-38, pg. 235.
- **In Class: A.11—Fuels and Climate—**Answer Questions 1-3 p. 232. **HW:** Study for Unit 3A Exam.