

Kenai Peninsula Borough School District
Science: Chemistry
Unit 11: HYDROCARBONS (ORGANIC CHEMISTRY)

Pacing:

NGSS Standards:

HS-LS1-6, 7

HS-ES2-6

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

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HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

ELA/LITERACY:

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3),(HS-PS1-5)(HS-LS1-6)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),(HS-PS1-5) (HS-LS1-6)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-PS1-3),(HS-PS1-6)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3) (HS-LS1-6)

MATHEMATIC STANDARD:

MP.2 Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)(HS-ES2-6)

MP.4 Model with mathematics. (HS-PS1-4),(HS-PS1-8) (HS-ES2-6)

HSN-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7), (HS-ES2-6)

HSN-Q.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),(HS-PS1-7), (HS-ES2-6)

HSN-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7),(HS-ES2-6)

ESSENTIAL QUESTIONS

1. Use the IUPAC rules to name the following structures.
2. Given the IUPAC names draw the hydrocarbons.
3. In what major way do the chemical properties of alkenes, alkanes and alkynes differ?
4. List the different types of isomers and explain their differences.
5. Draw all the structural isomers pliable of octane.
6. Explain how the physical properties of hydrocarbons make fractional distillation possible.
7. What is the purpose of cracking hydrocarbons?
8. Draw the structures for the following molecules
9. Name the functional group present in each of the following molecules
10. What are the products of the condensation reaction between a carboxylic acid and an alcohol?

11. Classify each of the following reactions as substitution, elimination, addition or condensation
12. Draw the structure of the polymer made from each of these monomers.....

BIG IDEAS:

1. Naming and properties of hydrocarbons (alkanes, alkenes, alkynes, cyclic etc.)
2. Isomers of hydrocarbons
3. Aromatic hydrocarbons and petroleum
4. Naming and properties of functional groups (alcohol, ketone, amides, amines, carboxyl esters, ethers etc.)
5. Reactions of organic compounds
6. Uses of polymers and their properties.

Vocabulary: Alkane, Alkene, Alkyne, Aromatic, Chirality, Cracking, Cyclic hydrocarbon, Cycloalkane, Fractional distillation, Geometric isomer, Homologous series, Hydrocarbon, Isomer, Optical isomer, Organic compound, Parent chain, Saturated hydrocarbon, Stereoisomer, Structural isomer, Substituent group, Unsaturated hydrocarbon, Addition polymerization, Alcohol, Aldehyde, Alkyl halide, Amide, Amine, Aryl halide, Condensation polymerization, Carbonyl, Carboxyl, Dehydration reaction, Dehydrogenation reaction, Elimination reaction, Ester, Ether, Functional group, Halocarbon, Halogenation, Hydration reaction, Hydrogenation reaction, Hydroxyl, Ketone, Monomer, Plastic Polymer, Polymerization, Substitution