03 Important Organic Functional Groups: Nomenclature & Reactions

Content Area: **Science**
Course(s): **Organic Chemistry H**
Time Period: **Semester 1**
Length: **6 weeks**
Status: **Published**

Standards

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.
PS1.A	Structure and Properties of Matter
PS2.B	Types of Interactions
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.
PS1.B	Chemical Reactions
	Patterns
HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
	Planning and Carrying Out Investigations
	Stability and Change
HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
	Structure and Function
	Developing and Using Models
	Constructing Explanations and Designing Solutions

Enduring Understandings

1. Understanding the structure and bonding of organic molecules is fundamental to being able to understand their properties and reactions.
2. Organic molecules can be categorized by the presence of functional groups.
3. Organic molecules are systematically named according to IUPAC rules.
4. Organic molecules can be represented in multiple ways.
5. Aromatic molecules have unusual structural and chemical properties that make it a special type of organic molecule.
6. Alcohols, phenols, and ethers can be thought of as derivatives of water in which one or both hydrogens are replaced with a hydrocarbon group.
7. Alcohols, phenols, and ethers are functional groups with significant influence on our modern-day way

of life.

Essential Questions

1. How do organic chemists name and categorize organic molecules?
2. How do the chemical names and formulas of compounds relate to their physical and chemical behaviors?
3. How do organic chemists draw and depict molecules?
4. How do molecules react to make new substances?
5. How does one characterize and explain reactions and make predictions about them?
6. What factors dictate whether a reaction will occur or not?
7. Why is it important to be able to predict the outcome of a reaction?
8. What does aromatic mean in organic chemistry?
9. How are derivatives of benzene formed and what properties do they have?
10. How are alcohols different from alkanes?
11. How do alcohols, ethers, and phenols react and what properties do they have?

Knowledge and Skills

Knowledge: Students will...

1. Identify the structure of benzene and explain why it has resonance.
2. Describe the bonding within the benzene ring structure.
3. Discuss the unexpected stability of benzene.
4. Describe the physical properties of aromatic compounds.
5. Discuss hydrogen bonding between alcohol molecules and explain its significance in relation to boiling point.
6. Describe the physical properties of alcohols and phenols.
7. Discuss the acidity and basicity of alcohols because of their structure.
8. Discuss the properties and structure of thiols and their significance.

Skills: Students will be able to...

1. Draw Kekule's structures for benzene.
2. Name monosubstituted benzene molecules according to IUPAC nomenclature rules.
3. Name disubstituted benzene derivatives using ortho, para, and meta isomer indications.
4. Name, and draw common benzene derivatives such a toluene, benzoic acid, benzaldehyde, phenol, and aniline,
5. Name polysubstituted benzene molecules and name molecules where aromatic rings are substituents.
6. Predict the products of the substitution reactions of benzene which include halogenation, sulfonation, nitration, and alkylation.
7. Draw and name the structures of alcohols, ethers, phenols, and thiols.
8. Classify an alcohol as primary, secondary or tertiary.
9. Name alcohols using IUPAC rules or common group names such as tertiary, iso, secondary, or normal.
10. Predict the products of dehydration of alcohols.
11. Predict the products of the oxidation of primary, secondary and tertiary alcohols.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit