

05 - Nomenclature of Compounds

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **11 Blocks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Chemistry CP aims to provide students with a fundamental understanding of the composition, structure, properties, and transformations of matter. Through a combination of theoretical concepts, laboratory investigations, and real-world applications, students will explore the principles and laws that govern chemical reactions and interactions. The course emphasizes the development of scientific inquiry skills, critical thinking abilities, and the application of problem-solving strategies. Students will actively engage in the process of scientific discovery, asking questions, seeking answers, and making connections between theory and practical applications. Laboratory experiences will integrate with theoretical knowledge, fostering the development of practical skills, scientific inquiry, and responsible practices. Students will also explore the ethical considerations and societal implications of chemistry, promoting informed decision-making as responsible citizens. By the end of the course, students will have a deepened appreciation for the relevance of chemistry in everyday life and will be prepared for further study and careers in scientific fields.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Explain the process of ion formation and the gain or loss of electrons from an atom.
- Predict the ionic charge of representative elements based on their position in the periodic table.
- Apply a systematic step-by-step method to name ions and their compounds.
- Identify and name ternary ionic compounds that involve polyatomic ions.
- Determine the name of binary covalent compounds using prefixes to indicate the count of each element.
- Understand the rules and conventions for naming compounds, including those with transition metals and Roman numerals.
- Differentiate between ionic and covalent compounds and their naming conventions.
- Demonstrate an understanding of the relationship between chemical formulas and compound names.
- Solve problems and apply the nomenclature rules to predict chemical names from formulas and vice versa.
- Communicate compound names effectively using appropriate terminology and conventions.
- Analyze and evaluate examples and practice exercises to reinforce nomenclature skills.

Essential Questions:

- How do ions form, and what role does the gain or loss of electrons play in their formation?
- How can the ionic charge of a representative element be predicted based on its position in the periodic table?
- What systematic method can be used to name ions and their compounds?
- What are ternary ionic compounds, and how are they named when they involve polyatomic ions?

- How can binary covalent compounds be named using prefixes to indicate the count of each element?

Enduring Understandings:

- The formation of ions occurs through the gain or loss of electrons from an atom.
- The ionic charge of a representative element can be predicted based on its position in the periodic table.
- Ions and their compounds can be named systematically using a step-by-step method.
- Ternary ionic compounds involve three or more elements, including polyatomic ions composed of two or more elements.
- The naming of binary covalent compounds can be determined using prefixes to indicate the count of each element.

CONTENT AREA STANDARDS

SCI.9-12.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.
SCI.9-12.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.
SCI.9-12.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.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

TECH.K-12.1.3.d	build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.9-10.2	Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
LA.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.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge' sections.

Declarative Knowledge

Students will understand that:

- The formation of ions involves the gain or loss of electrons from an atom.
- The ionic charge of a representative element can be predicted from its position on the periodic table.
- Ions and their compounds can be named using a systematic, step-by-step method.
- Ternary ionic compounds involve three or more elements, and include a polyatomic ion (made of two or more elements).
- The name of a binary covalent compound can be determined using prefixes to indicate the count of each element.

Procedural Knowledge

Students will be able to:

- Identify and describe the components of the model that are relevant to their predictions, including:
 - Elements and their arrangement in the periodic table;
 - A positively-charged nucleus composed of both protons and neutrons, surrounded by negatively-charged electrons;
 - Electrons in the outermost energy level of atoms (i.e., valence electrons); and
 - The number of protons in each element.
- Construct an explanation of the outcome of the given reaction, including:
 - The idea that the total number of atoms of each element in the reactant and products is the same;
 - The numbers and types of bonds (i.e., ionic, covalent) that each atom forms, as determined by the outermost electron states and the electronegativity;
 - The outermost (valence) electron state of the atoms that make up both the reactants and the products of the reaction is based on their position in the periodic table; and
 - A discussion of how the patterns of attraction allow the prediction of the type of reaction that occurs (e.g., formation of ionic compounds, combustion of hydrocarbons).

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

- POGIL Activities:
 - Naming Ionic Compounds

- Polyatomic Ions
- Naming Molecular Compounds
- Naming Acids
- Labs
 - Electrical Conductivity of Solutions
 - Precipitation Reactions
- Group practice
 - Introduction to Naming and Formula Writing
 - Converting Chemical Names into Formulas
 - Writing Chemical Names from Formulas
- Performance Scale/ Student Tracking Chart
- Whiteboards
- Exit Tickets
- Homework

Summative Assessments

Benchmarks – departmental benchmark given at the end of MP1, MP2, and MP3 based on lab practices

- Binary Ionic Compounds Quiz
- Polyatomic Ions Quiz
- Naming and Formula Writing Test
- Precipitation Reactions Lab Report
- Conductivity of Solutions Lab Report

Alternative Assessments

- Lab inquiries and investigations
- Lab Practicals
- Exploratory activities based on phenomenon
- Gallery walks of student work
- Creative Extension Projects
- Build a model of a proposed solution
- Let students design their own flashcards to test each other
- Keynote presentations made by students on a topic
- Portfolio

RESOURCES (Instructional, Supplemental, Intervention Materials)

[CK-12 Online Textbook](#)

POGIL Chemistry

Gizmos Simulations

PhET Simulations

Khan Academy

Bozeman Science

American Chemical Society

INTERDISCIPLINARY CONNECTIONS

ELA/Literacy

Mathematics

Technology

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.