

ARISE Curriculum Guide

Chemistry: Topic 15—Ionic and Metallic Bonds

ChemMatters

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Articles for Student Use

Breakfast of Crystals: Oct. 1983, pp. 8-12.

Permanent Waves: April 1993, pp. 8-11.

Matches. Striking Chemistry at Your Fingertips: Dec. 2002, pp. 14-16.

Memory Metal: Oct. 1993, pp. 4-7.

Mighty Thermite: Feb. 2002, pp. 14-15.

Articles for Teacher Use

Number and Topic: 8. Chemical Reactions
15. Ionic and Metallic Bonds
16. Covalent Bonds, Molecular Shapes and Intermolecular Forces
20. Acids/Bases/pH
21. Organic Chemistry
22. Redox/Electrochemistry

Source: *ChemMatters*, April 1993, pp. 8-11, “Permanent Waves”

Type of Material: Student Journal Article

Building on: Molecular structures, acids and bases

Leading to: Hydrogen bonds, amino acids, proteins,

Links to Physics:

Links to Biology: Structure of human hair, proteins

Good Stories:

Activity Description: Article details the complex structure of human hair and how permanent waves act on hair to produce their effect.

Number and Topic: 6. Chemical Names and Formulas/Compounds and Elements
15. Ionic and Metallic Bonds

Source: *ChemMatters*, Dec. 1992, pp. 4-6, “Salt”

Type of Material: Student Journal Article

Building on: Formulas and properties of ionic solids

Leading to: Comparison of different salt substitutes

Links to Physics:

Links to Biology: Effect of salt on blood pressure

Good Stories:

Activity Description: Article describes the composition of “salt,” different kind of “salt substitutes,” and the biological effects of salt.

Number and Topic **6. Chemical Names and Formulas/Compounds and Elements**
10. Phases, Solids, Liquids and Gases (States of Matter)
15. Ionic and Metallic Bonds

Source: *ChemMatters*, Oct. 1983, pp. 8-12, “Breakfast of Crystals”

Type of Material: Student Journal Article and Activity

Building on: Basic knowledge of chemical formulas

Leading to: Crystal structures, metals, alloys, glass

Links to Physics: Matter

Links to Biology:

Good Stories:

Activity Description: This article discusses several common substances and their crystal structures. It would be a good article for students to read if your course includes a unit on solid structures. The article is followed by a student activity on crystal growing.

Number and Topic: **8. Chemical Reactions**
11. Thermochemistry
15. Ionic and Metallic Bonds
22. Redox/Electrochemistry

Source: *ChemMatters*, Feb. 2002, pp. 14-15, “Mighty Thermite”

Type of Material: Student Journal Article

Building on: Chemical reactions

Leading to: Thermochemistry and redox

Links to Physics: Matter, energy, thermodynamics, heat, entropy

Links to Biology:

Good Stories:

Activity Description: Article describes the thermite reaction, its history, the thermodynamics behind it, and some of its practical applications.

Number and Topic: **4. Atomic Structure**
10. Phases, Solids, Liquids and Gases (States of Matter)
15. Ionic and Metallic Bonds

Source: *ChemMatters*, Oct. 1993, pp. 4-7, “Memory Metal”

Type of Material: Student Journal Article

Building on: Atomic structure, phases

Leading to: Crystal structures

Links to Physics: Matter

Links to Biology: Medical applications of nitinol metal

Good Stories: How nitinol metal was used to repair shoulder problems in Los Angeles Dodgers pitcher Orel Hershiser.

Activity Description: Article deals with Nitinol metal, the “memory” metal that returns to any shape that it was initially set in upon heating—even if it has been twisted or bent into a completely different shape. Article explains why this amazing phenomenon occurs and also shows several practical uses of this unusual property.

Flinn ChemTopic Labs

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Demo: Acid in the Eye – Safety
Demo: A Burning Candle - Observations
Demo: Classifying Matter
Demo: Flaming Vapor Ramp—Safety Demo
Lab: Observation and Experiment - Introduction to the Scientific Method
Lab: Separation of a Mixture - Percent Composition
Lab: What is a Chemical Reaction - Evidence of Change
Lab: Common Gases—Physical and Chemical Properties
Lab: Preparing and Testing Hydrogen Gas—A Microscale Approach
Lab: Carbon Dioxide - What a Gas—Microscale Gas Chemistry

ICE LABS

[Online Descriptions and Experiments](#)

Number and Topic: 15. Ionic and Metallic Bonds
Source: ICE Laboratory Leadership
Type of Material: Lab: 10. The Identification of Ions
Building on: 17. Water and aqueous solutions 14. Periodicity
Leading to: 8. Chemical Reactions
Links to Physics: Atomic energy levels and quantum numbers
Links to Biology: Solubility in the ambient medium is an important factor in many biological reactions.

Good Stories:

Activity Description: To verify the presence of a certain ion in solution, the properties of the ion must be known. To determine the relative solubilities of sulfates, oxalates, chromates, and carbonates of the alkaline earth metals and to use that information to analyze an unknown solution containing one alkaline earth cation. In this activity, you will determine the relative solubility of compounds formed from alkaline earth metal ions. The alkaline earth elements (magnesium, calcium, strontium, and barium) are all members of the same family of the periodic table. Also, you will devise and use a scheme to identify these ions in a solution.

Technology-Adapted Labs

No activities on this topic.