# Science
# Unit 2: Chemistry

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| **Essential Understandings** | ▪ All matter is made up of atoms.<br>▪ Substances can be combined in various ways.<br>▪ There are various states of matter.<br>▪ Matter can undergo both physical and chemical changes.<br>▪ Chemists plan, conduct, analyze data from, and communicate results of investigations. |
| **Essential Questions** | ▪ What is matter?<br>▪ What are atoms?<br>▪ What are the parts of an atom?<br>▪ What is a molecule?<br>▪ How does matter change its state?<br>▪ How do conditions and properties of a substance affect the way it combines with other substances?<br>▪ What is the difference between a compound and a mixture?<br>▪ How do atoms join together? |
| **Essential Knowledge** | ▪ Matter is anything that has mass and occupies space.<br>▪ An atom is the smallest unit of an element.<br>▪ An atom consists of a nucleus made of protons and neutrons, surrounded by electrons, and held together by electrical charges.<br>▪ A molecule is a group of atoms that is held together chemically.<br>▪ As elements are heated, their molecules move faster and they can change from a solid, to a liquid and then to a gas.<br>▪ As elements are cooled, their molecules move more slowly and they can change from a gas to a liquid and then to a solid.<br>▪ The properties of any material may change, but the total amount of materials remain the same.<br>▪ The weight of an object is equal to the sum of the weight of its parts.<br>▪ The temperature of one object is affected by the temperature of nearby objects.<br>▪ Compounds are formed when the atoms of two or more elements bond together (i.e., water)<br>▪ Mixtures are formed when elements come together but their atoms do not bond to form molecules (i.e., iron and sulfur, oil and water).<br>▪ Scientists use tools to conduct investigations, gather data, and answer questions.<br>▪ Scientists use evidence to develop and communicate theories and understandings. |

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| **Vocabulary** | ▪ Terms:<br>○ matter, atom, molecules, solid, liquid, gas, protons, neutrons, electrons, nucleus, element, mixture, compound, gas, condensation, energy, evaporation, shell, chemist, scientific inquiry, chemistry, property, data, mass, weight, bond |
| **Essential Skills** | ▪ Explain how matter changes between a solid, liquid and gas state.<br>▪ Identify nucleus, protons, neutrons, and electrons as part of an atom.<br>▪ Compare masses of parts (i.e., protons, neutrons, electrons).<br>▪ Show how compounds and mixtures are formed when elements come together.<br>▪ Describe what happens when elements are heated and cooled.<br>▪ Show that properties of a material may change, but the total amount of material remains the same.<br>▪ Ask questions and seek answers from reliable sources.<br>▪ Plan and conduct an investigation using appropriate tools.<br>▪ Use data to develop and communicate outcomes. |
| **Related Maine Learning Results** | Science<br>B. The Skills and Traits of Scientific Inquiry and Technological Design<br>B1. The Skills and Traits of Scientific Inquiry<br>Students plan, conduct, analyze data from, and communicate results of investigations, including fair tests.<br>a. Pose investigable questions and seek answers fro reliable sources of scientific information and from their own investigations.<br>b. Plan and safely conduct investigations including simple experiments that involve a fair test.<br>c. Use simple equipment, tools, and appropriate metric units of measurement to gather data and extend the senses.<br>d. Use data to construct and support a reasonable explanation.<br>e. Communicate scientific procedures and explanations. |

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| **Related Maine Learning Results** | D. The Physical Setting<br>D3. Matter and Energy<br>Students describe properties of objects and materials before and after they undergo a change or interaction.<br>a. Describe how the weight of an object compares to the sum of the weight of its parts.<br>b. Illustrate how many different substances can be made from a small number of basic ingredients.<br>c. Describe properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.<br>d. Describe what happens to the temperatures of objects when a warmer object is near a cooler object.<br>e. Describe how the heating and cooling of water and other materials can change the properties of the materials.<br>f. Explain that the properties of a material may change but the total amount of material remains the same. |
| **Sample Lessons And Activities** | ▪ Role play the molecules of a solid, liquid and gas.<br>▪ Observe water as it goes through three states.<br>▪ Conduct slime chemistry experiment.<br>▪ Create a dance or song for the states of matter.<br>▪ Combine substances to create a compound or mixture. |
| **Sample Classroom Assessment Methods** | ▪ Develop a slide show on states of matter.<br>▪ Draw a picture of water molecules as they change from the states of solid, liquid, and gas.<br>▪ Draw a diagram of an atom and label the parts. |
| **Sample Resources** | ▪ Publications:<br>o Chemical Changes – Kathryn Whyman<br>o Chemistry – Ann Newmark<br>o Janice VanCleave's Microscopes and Magnifying Lens – Janice VanCleave<br>o Janice VanCleave's Molecules – Janice VanCleave<br>o Kitchen Chemistry – Robert Gardner<br>o Of Cabbages and Chemistry – Jacqueline Barber<br>o Science Experiments with Water – Sam Rosenfeld<br>o Science Projects about Chemistry – Robert Gardner<br>o Simple Chemistry – Neil Ardley<br>o The Visual Dictionary of Chemistry – Jack Challoner<br>▪ Videos:<br>o Changes of State<br>o Chemical Reactions<br>o Chemistry In The Kitchen<br>o Periodic Table |

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