

# 8<sup>th</sup> Grade Physical Science

## Unit 1: Structure of Matter

Standard S8P1: Students will examine the scientific view of the nature of matter.

Element a) Distinguish between atoms and molecules.

Element b) Describe the difference between pure substances (elements and compounds) and mixtures.

Element c) Describe the movement of particles in solids, liquids, gases, and plasma states.

Element d) Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

Element e) Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

Element f) Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

Element g) Identify and demonstrate the Law of Conservation of Matter.

### Unit Essential Questions

1. How do chemical and physical properties differ?
2. How do chemical and physical changes differ?
3. What happens when a material changes states?
4. What are the differences between elements, compounds, and mixtures?
5. What general criteria are used for the placing of elements on the periodic table?
6. How does burning wood demonstrate the law of conservation of matter?

Students will know that: (THE FACTS)

- Pure substances consist of homogeneous particles.
- Molecules are made of one or more atom(s) of two or more elements.
- Mixtures are combinations of compounds or elements that do not form a new substance.
- Solids, liquids, gases and plasma are states of matter.
- Particles have different amounts of movement depending on the state of matter.
- Matter takes up space and has mass.
- Physical properties of matter include density, melting point and boiling point.
- Chemical properties of matter include reactivity and combustibility.
- Elements are arranged on the Periodic Table by the number of protons and the arrangement of electrons.

Students will be able to: (CAN YOU?)

- Identify pure substances.
- Identify mixtures.
- Describe the difference between pure substances and mixtures.
- Describe the movement of particles in the different states of matter.
- Distinguish between physical and chemical properties.
- Distinguish between physical and chemical changes.
- Describe the relationship between elements and the periodic table.
- Relate the atomic number to the atomic mass.
- Apply the Law of Conservation of Matter to a given situation (Ex. wood burning in a fireplace).

# Unit 1: Intro to Matter

## Vocabulary

- **matter** - anything that takes up space and has mass.
- **atom** - a very small particle that makes up most kinds of matter and consists of smaller parts called protons, neutrons, and electrons; basic unit of matter.
- **law of conservation of matter** - matter is neither created or destroyed but only changes its form.
- **electron** - invisible, negatively charged particle located in a cloudlike formation that surrounds the nucleus of an atom.
- **neutron** - an uncharged particle located in the nucleus of the atom.
- **proton** - positively charged particle located in the nucleus of the atom; counted to identify the atomic number.
- **nucleus** - positively charged, central part of an atom.
- **atomic number** - number of protons in the nucleus of each atom of a given element; is the top number in the periodic table.
- **mass number** - sum of the number of protons and neutrons in the nucleus of an atom.
- **atomic mass** - average mass of an atom of an element; its unit of measure is the atomic mass unit.
- **metal** - element that is malleable, ductile, a good conductor of electricity, and generally has a shiny or metallic luster.
- **nonmetal** - elements that are usually gases or brittle solids and poor conductors of electricity and heat; are the basic chemicals of life.
- **metalloid** - element that has characteristics of both metals and nonmetals and is a solid at room temperature.
- **substance** - matter that has the same composition and properties throughout.
- **compound** - a substance produced when elements combine to form molecules whose properties are different from each of the elements in it.
- **mixture** - a combination of compounds and elements that has not formed a new substance and whose proportions can be changed without changing the mixture's identity.
- **element** - natural or synthetic material that cannot be broken down into simpler materials by ordinary means; has unique properties and is generally classified as a metal, metalloid, or nonmetal.
- **solid** - matter with a definite shape and volume; has tightly packed particles that move mainly by vibrating.
- **liquid** - matter with a definite volume but no definite shape that can flow from one place to another.
- **gas** - matter that does not have a definite shape or volume, has particles that move at high speeds in all directions.
- **temperature** - measure of average value of the kinetic energy of the particles in a substance; can be measured using Fahrenheit, Celsius, and Kelvin scales.
- **heat** - movement of thermal energy from a substance at a higher temperature to a substance at a lower temperature.
- **melting** - change of matter from a solid state to a liquid state.
- **freezing** - change of matter from a liquid state to a solid state.
- **vaporization** - change of matter from a liquid state to a gas.
- **condensation** - change of matter from a gas to a liquid state.
- **pressure** - force exerted on a surface divided by the total area over which the force is exerted.
- **state of matter** - physical property that describes a substance as a solid, liquid, or gas.
- **chemical property** - characteristic of something that permits its change to something new.
- **physical property** - any characteristic of matter- such as color, shape, and taste-that can be detected by the senses without changing the identity of the matter.
- **chemical change** - any change of a material into a new material with different properties.
- **physical change** - any change in the size, shape, form, or state of matter in which the matter's identity remains the same.
- **reactivity** - describes how easily something reacts with something else.