Important Concepts for **Physical Science** Grades 6-8 Properties of Matter	Alaska State Science Standard B1: Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior Alaska State Science Standard B3**:** Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems. (partially addressed)

Grade Level Expectations:
The student demonstrates understanding of the structure and properties of matter by
[6] SB1.1 using models to represent matter as it changes from one state to another
[7] SB1.1 using physical properties (i.e., density, boiling point, freezing point, conductivity) to differentiate among and/or separate materials (i.e., elements, compounds, and mixtures)
[8] SB1.1 using physical and chemical properties (i.e., density, boiling point, freezing point, conductivity, flammability) to differentiate among materials (i.e., elements, compounds, and mixtures)

The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by
[6] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on temperature
[7] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on the motion of their
particles
[8] SB3.1 exploring changes of state with increase or decrease of particle speed associated with heat transfer (**L**)
[8] SB3.2 exploring through a variety of models (e.g.,gumdrops and toothpicks) how atoms may bond together into well defined molecules or bond together in large arrays (**L**)

According to AAAS's Benchmarks for Science Literacy*, some of the things that students should know and understand by the end of the eighth grade are:
• Equal volumes of different materials usually have different masses.
• A substance has characteristic properties such as density, a boiling point, and solubility, all of which are independent of the amount of the substance and can be used to identify it.
· All matter is made up of atoms, which are far too small to see directly through a microscope.

*Project 2061, American Association for the Advancement of Science, Benchmarks for Science Literacy. New York: Oxford University Press, 1993.

· The atoms of any element are like other atoms of the same element, but are different from the atoms of other elements.
* Chemical elements are those substances that do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. All substances from living and nonliving things can be broken down to a set of about 100 elements, but since most elements tend to combine with others, few elements are found in their pure form.
· Atoms may link together in well-defined molecules, or may be packed together in crystal patterns. Different arrangements of atoms into groups compose all substances and determine the characteristic properties of substances.
· Atoms and molecules are perpetually in motion. Increased temperature means greater average energy of motion, so most substances expand when heated.
· In solids, the atoms or molecules are closely locked in position and can only vibrate. In liquids, they have higher energy, are more loosely connected, and can slide past one another; some molecules may get enough energy to escape into a gas. In gases, the atoms or molecules have still more energy and are free of one another except during occasional collisions.

*Project 2061, American Association for the Advancement of Science, Benchmarks for Science Literacy. New York: Oxford University Press, 1993.