

CH1 FACT SHEET

THE PROPERTIES AND PHASES OF MATTER

CLASSWORK AGENDA FOR THE WEEK

- (1) List the common properties of matter and contrast its various phases.
 - (2) Compare temperature scales and calibrate a thermometer.
 - (3) Graph the temperature of water as it changes from a liquid to a solid.
 - (4) Demonstrate that evaporation is a cooling process.
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The universe is made up of two things: **energy** and **matter**. All forms of energy have the ability to do work and there are many different kinds of energy: heat energy, light energy, electrical energy, mechanical energy, and so on. **Matter** is the material substance that makes up all the objects around us. Although matter can exist in many different forms, all forms of matter have some basic properties in common. First, all forms of matter take up space. They have **volume**. Second, all forms of matter have mass. **Mass** is the amount of matter in an object which can be measured using a tool called a **balance**. **Sir Isaac Newton** (b. 1642; d. 1727) discovered that all objects are attracted to other objects by the force of gravity. The force of attraction that one object has for another object is called **weight**. Since all matter has mass, all matter also has weight in a gravitational field.

Matter exists in four states or phases: **solid**, **liquid**, **gas**, or **plasma**. *Solids*, like rock and glass, have definite shape and definite volume. *Liquids*, like water and mercury, can change shape while retaining the same volume. *Gases*, like oxygen and carbon dioxide, change both shape and volume. *Plasma* is a highly energized gas made of electrically charged particles like electrons and protons. The trillions upon trillions of particles radiating toward earth from the sun—called the solar wind—is an example of a plasma.

Matter can change from one form or **phase** to another. Heating a solid causes the **atoms** that make up the solid to move faster. As the atoms absorb heat energy they move around more freely turning the solid into a liquid. This process is called **melting**. When the atoms of a liquid absorb heat they can leave the liquid entirely to form a **gas** or vapor. This process is called **vaporization**. Some solids, such as frozen carbon dioxide (commonly called dry ice), change directly into a gas when warmed. This process is called **sublimation**. Heating a gas may cause the tiny charged particles inside atoms to separate. *Electrons* leave their orbits around the atom's *nucleus* and the gas becomes an electrically charged **plasma**. **Condensation** is a term used to describe the cooling of a gas to form a liquid. **Freezing** describes the cooling of a liquid to form a solid. All of these changes are **physical changes**. In a physical change the shape or form of the matter may change but it remains the same kind of matter. Ice, water, and steam (i.e., solid, liquid, and vapor) are all simply different forms of water.

CH1 Fact Sheet (cont'd)

Homework Directions

Perform the following experiment to demonstrate the effects of extreme cold on liquid water.

1. Fill two plastic or paper straws with water.
2. Plug the ends of each straw with clay or chewed gum. Make sure there are no air bubbles left inside either of the straws. Draw the two straws lying side by side; label one straw "Straw A" and the other "Straw B." Label the drawing "BEFORE."
3. Wrap each straw in a paper towel. Place Straw A in the freezer compartment of a refrigerator. Place Straw B on a paper plate on top of the refrigerator.
4. Examine the straws 24-hours later. Draw the straws as you did the day before and label the drawing "AFTER."
5. Describe what happened to the water in each straw and draw a conclusion about the effects of extreme cold on the liquid water.

Assignment due: _____

Student's Signature

Parent's Signature

____/____/____
Date