Name: Key. Cohort:

Date: Advisor:

Physical Sci #2

Changes: Physical or Chemical?

By Cindy Grigg

[1] If you have studied atoms, you know that atoms are the building blocks of matter. Atoms are so small they cannot be seen with an ordinary microscope. Yet atoms make up everything in the universe. Atoms can combine with different atoms and make new substances. Substances can also break apart into separate atoms. These changes are called chemical changes or reactions. Chemical reactions happen when atoms gain, lose, or share electrons. What about when water freezes into ice? Do you think that's a chemical change?

[2] When water freezes, it has changed states. You probably already know about the four states of matter. They are solid, liquid, gas, and plasma. Plasma is the fourth state of matter and is the most common state in the universe. However, it is rarely found on Earth. Plasma occurs as ball lightning and in stars. Water is a common substance that everyone has seen in its three states of matter. Water in its solid state is called ice. Water in the liquid state is just called water. Water as a gas is called water vapor. We can easily cause water to change states by changing its temperature. Water will freeze at 32 degrees Fahrenheit (0° Celsius). However, no chemical change has occurred. The atoms have not combined or broken apart to make a different substance; it is still water or H2O. When we heat water to a temperature of 212° F. or 100° Celsius, it will change into a gas called water vapor. Changes in states of matter are just physical changes.

[3] Some more examples of physical changes are tearing paper into smaller pieces, sharpening your pencil, and stirring sugar into water. When you tear a piece of paper, it is still paper; it's just that the pieces are smaller. That is a physical change; a change you can easily see. When you sharpen your pencil, you have only caused a physical change. The sharpener has cut off some of the wood and maybe also some of the graphite, but the atoms of the wood and graphite have not changed chemically. You might think that the shavings you find inside the pencil sharpener are a new substance, but chemically they are not. They are still wood and graphite in smaller pieces than the original. When you stir sugar into water, you have only caused a physical change. The glass still contains water and sugar, but they have been mixed together. Is the sugar still there? Yes, you can taste it. This is only a physical change.

[4] Chemical changes are different because they cause a new substance to be formed, and they also either release energy or absorb it. Burning is a good example of a chemical change. When we burn wood, it releases energy in the form of heat and creates new substances: smoke and ash. Some signs of a chemical change are: smoking, change in color, change in temperature, bubbling, and fizzing. Have you ever mixed vinegar and baking soda together? If you have, you know that it bubbles! This is an example of a

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1. When do chemical reactions happen? (A) When matter changes states (B) When water boils (C) When water freezes into ice (D) When atoms gain, lose, or share electrons	2. How many states of matter are there? (A) Two (B) Four (C) One (D) Three
3. Matter in the plasma state is the most common in the universe. (A) False (B) True	4. Matter in the plasma state is the most common on Earth. (A) False (B) True
5. Changes in states of matter are _____. (A) Chemical changes (B) Neither (C) Physical changes	6. Why are chemical changes different from physical changes? (A) A new substance is formed. (B) They cannot be easily undone. (C) They release energy or absorb it. (D) All of the above
7. Which one of these is **not** a sign of a chemical change? (A) Smoking (B) Change in color (C) Change in shape (D) Bubbling	8. According to the passage, what is the most important chemical reaction of all? (A) Photosynthesis (B) Burning fuel (C) Respiration (D) Eating

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