

CLASSIFICATION OF MATTER AND CHEMICAL AND PHYSICAL PROPERTIES AND CHANGES KEY

1. Classify the following as either elements, compounds, solutions, or heterogeneous mixtures.
 - a. tomato catsup **heterogeneous mixture**
 - b. iodine crystals **element**
 - c. filtered apple juice **solution**
 - d. carbon dioxide **compound**
 - e. common garden soil **heterogeneous mixture**

2. Classify the following as either chemical or physical changes.
 - a. the condensation of steam on a bathroom mirror **physical**
 - b. breaking a pencil in two **physical**
 - c. the decomposition of plants in a compost heap **chemical**

3. Classify the following as either chemical or physical properties of a substance.
 - a. a substance has a melting point = 276 °C **physical**
 - b. a substance will oxidize at high temperature in air **chemical**
 - c. a substance is a good electrical conductor **physical**

CHEMISTRY 151 - PHYSICAL AND CHEMICAL CHANGES AND PROPERTIES AND TEMPERATURE CONVERSIONS KEY

1. A sample of mercury(II) oxide was heated to produce mercury metal and oxygen gas. Then the liquid mercury was cooled to $-40\text{ }^{\circ}\text{C}$, where it solidified. A glowing wood splint was thrust into the oxygen, and the splint burst into flame. Identify each physical change and each chemical change.
 - a. $\text{HgO}(\text{s}) \rightarrow \text{Hg}(\text{l}) + \text{O}_2(\text{g})$ **chemical**
 - b. $\text{Hg}(\text{l}) \rightarrow \text{Hg}(\text{s})$ **physical**
 - c. $\text{Wood}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ **chemical**

2. Iodine is a solid with somewhat lustrous, blue-black crystals. The crystals vaporize readily to a violet-colored gas. Iodine, like chlorine, combines with many metals. For example, aluminum combines with iodine to give aluminum iodide. Identify each of these characteristics of iodine as physical and chemical properties.

Physical Properties - solid, lustrous, blue-black, and vaporize to violet gas

Chemical Properties - combines with metals and combines with aluminum to give aluminum iodide

3. Liquid nitrogen can be used for the quick freezing of foods. The liquid boils at $-196\text{ }^{\circ}\text{C}$. What is this temperature in degrees Fahrenheit and kelvins?

$$^{\circ}\text{F} = -196\text{ }^{\circ}\text{C} \left(\frac{1.8\text{ }^{\circ}\text{F}}{1\text{ }^{\circ}\text{C}} \right) + 32\text{ }^{\circ}\text{F} = -321\text{ }^{\circ}\text{F} \qquad \text{K} = -196\text{ }^{\circ}\text{C} + 273.15 = 77\text{ K}$$

4. Milk can be pasteurized to kill disease-causing organisms by heating it to $161\text{ }^{\circ}\text{F}$ for 15 seconds. What is this temperature in degrees Celsius and Kelvin?

$$^{\circ}\text{F} = (161\text{ }^{\circ}\text{F} - 32\text{ }^{\circ}\text{F}) \left(\frac{1\text{ }^{\circ}\text{C}}{1.8\text{ }^{\circ}\text{F}} \right) = 71.7\text{ }^{\circ}\text{C} \qquad \text{K} = 71.7\text{ }^{\circ}\text{C} + 273.15 = 344.9\text{ K}$$

