

Problem Set 3: Chemical Versus Physical Changes and Classifying Matter

1. Classify the following as either a pure substance or a mixture.
 - a. helium (He) gas
 - b. carbon monoxide (CO) gas
 - c. 14 K gold
 - d. 1% milk
2. For each problem in #1, classify further as an element, compound, homogeneous or heterogeneous mixture.
3. Classify the following as a chemical or physical change.
 - a. water freezing
 - b. glass shattering
 - c. making orange juice from frozen concentrate
 - d. burning a candle
 - e. hydrogen peroxide decomposing into water and oxygen when rubbed on the skin
 - f. water boiling
4. Indicate the state of each substance at room temperature and atmospheric pressure.
 - a. table salt
 - b. oxygen
 - c. water
 - d. table sugar
5. Butane has a melting point of $-138\text{ }^{\circ}\text{C}$, and a boiling point near $0\text{ }^{\circ}\text{C}$. What is the state of butane at the following temperatures (assume normal atmospheric pressure).
 - a. $23\text{ }^{\circ}\text{C}$
 - b. $-8\text{ }^{\circ}\text{C}$
 - c. 0 K
6. When sodium metal is dropped into water there are two products formed. One product is a gas and the other is a water soluble substance. The gas can not be broken down further by chemical means. The water soluble substance can be broken down further into the elements sodium, oxygen and hydrogen. Classify the two products (the gas and the soluble substance) as elements or compounds.