

## Extra Problems for Chapter 2

1. Classify the following as an element, compound, heterogeneous mixture, or homogeneous mixture.
  - a. A punch made from fruit juice and soda water
  - b. Ice cream with chunks of cookie dough in it
  - c. A sample of iron, which cannot be broken down into simpler substances
  - d. The pure substance made when magnesium and chlorine combine
  - e. Sulfur
  - f. Tea
  - g. A chocolate-chip cookie
  - h. Sodium nitrate, which can be broken down into sodium, nitrogen, and oxygen
  
2. A student does a chemical reaction with two chemicals. The total mass of the two chemicals is 17.0 grams. When she is done, she finds that the mass of all the chemicals she has collected is now 17.8 grams. The teacher says the student obviously contaminated the experiment with something else. How does the teacher know this? What is the mass of the contaminants?
  
3. A chemist combines 63.55 grams of copper with 100.00 grams of chlorine gas. The result is 134.45 grams of a light blue powder and some leftover chlorine.
  - a. How much copper and chlorine are needed to make 500.0 grams of the light blue powder with no leftovers?
  
  - b. Another chemist combines 100.00 grams of copper with 111.57 grams of chlorine to make a solid. There are no leftovers. Is this the same compound as the light blue powder made in "a?"
  
  - c. Another chemist combines 63.55 grams of copper with 35.45 grams of chlorine gas to make a solid. There are no leftovers. Is this the same compound as what was made in "a.?"
  
  - d. If the compound made in "a" is composed of one copper atom and two chlorine atoms, how many chlorine atoms are in the compound made in "c?"
  
4. A chemist combines 30.00 grams of silicon with 32.00 grams of oxygen. The result is 60.09 grams of a solid and some leftover silicon. How much silicon and oxygen should she use to make 150.00 grams of the solid with no leftovers?
  
5. The compound in #4 is composed of one silicon atom and two oxygen atoms. If a chemist reacts 28.09 g of silicon with 16.00 grams of oxygen to make a different compound with no leftovers, how many oxygen atoms are in that compound?
  
6. A chemist is making two different compounds from the same two elements: nitrogen and oxygen. To make the first gas, she reacts 14.01 grams of nitrogen and 16.00 grams of oxygen to make 30.01 grams of the first gas, which is composed of one nitrogen atom and one oxygen atom. Suppose she starts with 14.01 grams of nitrogen again but wants to make a gas composed of one

atom of nitrogen and three atoms of oxygen. What mass of oxygen should she use so there are no leftovers?

7. Which two of the following atoms would be isotopes?
  - a. An atom made of 11 protons, 12 neutrons, and 11 electrons
  - b. An atom made of 11 protons, 11 neutrons, and 11 electrons
  - c. An atom made of 12 protons, 12 neutrons, and 12 electrons
  - d. An atom made of 12 protons, 12 neutrons, and 12 electrons
  
8. Which of the two isotopes you found in #7 would be the lightest?