

Name _____

Date _____ Class _____

Chemistry: The Science of Matter

CHAPTER 1

Understanding Concepts Part B

Use with text pages 2 – 49

In the space provided, explain how the two terms in the following pairs relate to one another.

- matter and mass Mass is a measure of the amount of matter in something.
- chemical property and physical property The composition of something must be changed to determine a chemical property but does not need to be changed to determine a physical property.
- heterogeneous and homogeneous Samples of a heterogeneous material are not all the same. Homogeneous materials are the same throughout.
- pure substance and element An element is one class of pure substance.
- qualitative observation and quantitative observation A quantitative observation uses measurement, whereas a qualitative observation can be made without measurement.
- mixture and solution A mixture may be heterogeneous or homogeneous in composition, whereas a solution is always homogeneous.
- solution and alloy An alloy is a solid solution that contains different metals and sometimes nonmetals.
- solution and aqueous solution An aqueous solution always has water as the solvent, but solutions do not have to contain water.
- sodium and Na Sodium is the name of an element, and Na is its chemical symbol.
- Na and NaCl Na is a chemical symbol, and NaCl is a chemical formula.
- density and mass Density is the mass of a specific volume of a material.
- freezing point and melting point The freezing point and melting point of a substance are the same temperature.
- endothermic and exothermic Endothermic refers to chemical reactions in which energy is absorbed, and exothermic to ones in which energy is given off.

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CHAPTER 1

Thinking Critically

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Listed below are a number of changes that can be observed in everyday life. Tell whether each change is a physical change or a chemical change. Then explain the basis on which you made your decision.

- an icicle melting physical change: Solid water changes to liquid water.
- charcoal burning chemical change: Charcoal (carbon) reacts to form gases (carbon dioxide and water vapor)
- magnetizing a piece of steel physical change: The steel does not change its composition during magnetization.
- iron rusting chemical change: The iron is converted into a new substance (iron oxide, or rust).
- rubbing alcohol evaporating from the skin physical change: Liquid alcohol changes to a vapor.

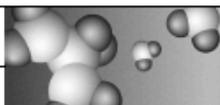
Answer each of the following questions.

- Suppose you were given a mixture of sand and salt to separate from each other. What physical property could you use to accomplish this task?
Solubility; salt will dissolve in water, but sand will not.
- A test tube without any label contains a clear liquid known to be either pure water or ethanol (ethyl alcohol). What physical properties could you use to tell what the liquid is? Among the properties that could be used would be smell and density.
- A white solid is heated in a test tube. The solid slowly changes color to a grayish powder, and a gas escapes from the test tube. Is the white solid an element or a compound? Is the grayish powder an element or a compound? Explain your answers. The white solid must be a compound since it broke down into two new substances. No decision on the grayish powder can be made since it would have to be examined first.

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CHAPTER 1

● Interpreting Data and Lab Skills

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The table below gives the density of selected substances. Answer the following questions.

Substance	Density (g/mL)
water (at 4.0°C)	1.000
hydrogen	0.00090
carbon dioxide	XXX
gasoline	0.68
copper	8.89
silver	10.5
mercury	13.595
tungsten	19.3

- Which of the substances listed in the table has the greatest density? the lowest density? Tungsten has the greatest density, 19.3 g/mL. Hydrogen has the lowest density, 0.00090 g/mL.
- If you were given a milliliter of copper and a milliliter of silver, which would weigh more? Silver would weigh more.
- Corks are used on fishing lines because they float. What can you say about the density of cork? The density of cork must be less than 1.000 g/mL.
- To complete the table, calculate the density for carbon dioxide if 250.0 mL of the gas has a mass of 0.4997 g. The density is 0.001999 g/ml
- Suppose that 10 mL of each of the three liquids in the table—water, gasoline, and mercury—were all placed in a test tube. The liquids do not mix with one another. In the three layers that would be produced, which liquid would be on top, which in the middle, and which on the bottom? Gasoline floats on water, and water floats on mercury.