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CHAPTER 3 SOLUTIONS MANUAL

Matter—Properties and Changes

Section 3.1 Properties of Matter

pages 70–75

Problem-Solving Lab

1. Explain why the flow of a compressed gas must be controlled for practical and safe use.
The flow of compressed gas must be controlled to control the amount and the rate at which gas is released.

2. Predict what would happen if the valve on a full tank of compressed gas were suddenly opened all the way or if the tank were accidentally punctured.
Without the regulator device, the gas would rush out of the tank with a force powerful enough to transform the tank into a dangerous, uncontrolled projectile.

Section 3.1 Assessment

page 75

1. Create a table that describes the three common states of matter in terms of their shape, volume, and compressibility.

	Volume	Shape	Compressibility
Solid	Definite	Definite	Incompressible
Liquid	Definite	Takes shape of container and fills container to the extent of its own volume	Virtually incompressible
Gas	Fills volume of container	Takes shape of container	Compressible

2. Describe the characteristics that identify a sample of matter as being a substance.
The sample of matter must have a uniform and unchanging composition to be a substance.

3. Classify each of the following as a physical or chemical property.

- a. Iron and oxygen form rust. *chemical*
- b. Iron is more dense than aluminum. *physical*
- c. Magnesium burns brightly when ignited. *chemical*
- d. Oil and water do not mix. *physical*
- e. Mercury melts at -39°C . *physical*

4. **Organize** Create a chart that compares physical and chemical properties. Give two examples for each type of property.
The chart should make clear that physical properties can be observed without changing the composition of the sample, which is not the case for chemical properties. Mass and density are examples of physical properties. Fermentation and rotting are examples of chemical properties.

Section 3.2 Changes in Matter

pages 76–78

Practice Problems

page 78

3. Use the data in the table to answer the following questions.

Aluminum and Liquid Bromine Reaction		
	Before Reaction	After Reaction
Aluminum	10.3 g	0.0 g
Liquid bromine	100.0 g	8.5 g
Compound	0.0 g	8.5 g

How many grams of bromine reacted? How many grams of compound were formed?

amount of bromine that reacted = $100.0\text{ g} - 8.5\text{ g} = 91.5\text{ g}$
amount of compound formed = $100.0\text{ g} + 10.3\text{ g} - 8.5\text{ g} = 101.8\text{ g}$

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