

## Chapter 3 Practice

### 3.1 Atoms: The Essential Building Blocks

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1. List four key features of Dalton's atomic theory.
2. When it burns, 24.3 grams of magnesium can react completely with 16.0 grams of oxygen gas to form a new compound, magnesium oxide. No other compounds are formed. What mass of magnesium oxide is formed in this reaction?

### 3.2 The Periodic Table of the Elements

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3. Complete the table below to show the elements and symbols. See how many you can do by memory, then check yourself to see if you are correct.

| Element   | Symbol | Element  | Symbol | Element | Symbol | Element | Symbol |
|-----------|--------|----------|--------|---------|--------|---------|--------|
| hydrogen  | H      | nitrogen |        |         | Br     |         | Pd     |
| carbon    |        | argon    |        |         | Fe     |         | Sn     |
| silicon   |        | lead     |        |         | Ag     |         | I      |
| magnesium |        | gold     |        |         | Cr     |         | Li     |

4. Using the periodic table, identify each element as a metal, a metalloid, or a nonmetal:  
a. carbon                      b. aluminum                      c. germanium                      d. thorium

### 3.3 Uncovering Atomic Structure

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5. Rank the following ideas or discoveries in the order they occurred:

| Order | Event                           |
|-------|---------------------------------|
|       | Dalton's atomic theory          |
|       | Thomson discovers the electron  |
|       | Plum pudding model              |
|       | Rutherford proposes the nucleus |
|       | Volta's electrochemical cell    |
|       | Mendeleev's periodic table      |

### 3.4 Describing Atoms: Identity and Mass

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6. Write the atomic symbol, including the atomic number and the mass number, for each of the following:
- a. a silicon atom with 14 neutrons
  - b. a gallium atom with 39 neutrons
  - c. a hydrogen atom with 2 neutrons
  - d. a lithium atom with 4 neutrons

7. Write an atomic symbol (including atomic number and mass number) for an **isotope** of carbon-12.

8. Complete the table below:

| Atom     | Symbol | Protons | Neutrons | Atomic Number | Mass Number |
|----------|--------|---------|----------|---------------|-------------|
| Hydrogen | H      | 1       | 0        |               |             |
| Sulfur   |        |         | 16       |               |             |
|          |        | 52      |          |               | 128         |
|          | He     |         | 2        |               |             |
|          |        |         | 51       | 40            |             |

### 3.5 Electrons – A Preview

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9. Briefly describe how each model of the atom described electron structure:

| Model              | Description |
|--------------------|-------------|
| Plum pudding model |             |
| Bohr model         |             |
| Quantum model      |             |

10. Calculate the overall charge on these atoms/ions:

- a. A calcium ion with 20 protons, 20 neutrons, and 18 electrons
- b. An iron ion with 26 protons, 30 neutrons, and 23 electrons
- c. A platinum ion with 74 electrons
- d. An iodide ion with 54 electrons
- e. A phosphorous ion with 16 neutrons and 18 electrons