

- Antoine Lavoisier was guided by the idea that the masses of the reactants equalled the masses of the products for every chemical reaction.
- Marie-Anne Lavoisier became a student of chemistry after she married Antoine. They worked together under Antoine's direction. Marie spoke and wrote in English and translated for Antoine, who spoke only French.

### SECTION 4.3 ASSESSMENT, p. 215

#### Check Your Understanding Answers

##### Checking Concepts

- Heptane, oxygen
  - $\text{CO}_2$ ,  $\text{H}_2\text{O}$
  - 7
  - Reacts with
- $\text{H}_2 + \text{N}_2 \rightarrow \text{NH}_3$

##### Understanding Key Ideas

- $2\text{Al} + 3\text{F}_2 \rightarrow 2\text{AlF}_3$
  - $3\text{PbCl}_4 + 4\text{K}_3\text{PO}_4 \rightarrow 12\text{KCl} + \text{Pb}_3(\text{PO}_4)_4$
  - $3\text{Br}_2 + 2\text{FeI}_3 \rightarrow 3\text{I}_2 + 2\text{FeBr}_3$
  - $3\text{Na}_2\text{CO}_3 + 2\text{Cr}(\text{NO}_3)_3 \rightarrow 6\text{NaNO}_3 + \text{Cr}_2(\text{CO}_3)_3$
  - $\text{Mn} + 2\text{I}_2 \rightarrow \text{MnI}_4$
  - $2\text{C}_2\text{H}_6 + 5\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$
  - $\text{K}_2\text{SO}_4 + 2\text{AgNO}_3 \rightarrow \text{Ag}_2\text{SO}_4 + 2\text{KNO}_3$
  - $\text{Ca}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$
  - $\text{Mg}_3\text{N}_2 \rightarrow 3\text{Mg} + \text{N}_2$
  - $2\text{Fe} + 3\text{CuCl}_2 \rightarrow 2\text{FeCl}_3 + 3\text{Cu}$
- $2\text{Li}_3\text{PO}_4 + 3\text{MgSO}_4 \rightarrow 3\text{Li}_2\text{SO}_4 + \text{Mg}_3(\text{PO}_4)_2$
  - $\text{ZnI}_2 + 2\text{CuNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{CuI}$
  - $\text{Hg}(\text{NO}_3)_2 + 2\text{NaHCO}_3 \rightarrow 2\text{NaNO}_3 + \text{Hg}(\text{HCO}_2)_2$
  - $2\text{NiI}_3 + 2\text{FeS} \rightarrow \text{Ni}_2\text{S}_3 + 3\text{FeI}_2$
  - $2\text{Al}(\text{OH})_3 + 6\text{HF} \rightarrow 2\text{AlF}_3 + 3\text{H}_2\text{O}$
  - $2\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{H}_2\text{O}$
  - $\text{CaBr}_2 + \text{K}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{KBr}$
  - $2\text{TiF}_3 + 3\text{Cs}_2\text{SO}_3 \rightarrow 6\text{CsF} + \text{Ti}_2(\text{SO}_3)_3$
  - $\text{BaSO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{Ba}(\text{OH})_2$
  - $\text{CaCl}_2 + 2\text{K} \rightarrow 2\text{KCl} + \text{Ca}$
  - $2\text{HNO}_3 + \text{SrCO}_3 \rightarrow \text{Sr}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$

#### Pause and Reflect Answer

Students' answers may include the following.

- The law of conservation of mass is consistent with the idea that matter is made out of atoms that are not produced or destroyed in a chemical reaction.

- Since each atom has a specific and unchanging mass, a rearrangement of atoms in a chemical reaction does not affect the total mass of the system.

#### Other Assessment Opportunities

- BLM 2-23, Chapter 4 Quiz
- Assessment Checklist 1, Making Observations and Inferences
- Assessment Checklist 25, Safety Checklist
- Process Skills Rubric 1, Developing Models
- Assessment Rubric 5, Conduct an Investigation Rubric
- Assessment Rubric 11, Communication Rubric

### CHAPTER 4 ASSESSMENT, p. 216-217

#### PREPARE YOUR OWN SUMMARY

Student summaries should incorporate the following main ideas.

- Relate Atomic Theory to Bonding
  - Atoms are composed of three subatomic particles called protons, neutrons, and electrons.
  - Most of the mass of the atom is contained in the nucleus and is due to protons (positive) and neutrons (negative).
  - Most of the volume of the atom is occupied by electrons, which occupy energy levels near the nucleus.
  - The periodic table arranges elements into periods and families according to their chemical properties and their arrangement of electrons.
  - Bohr model diagrams show the number and arrangement of electrons in an atom, ion, molecule (element or compound), and ionic compound.
  - Lewis diagrams show bonding pairs and lone pairs of valence electrons in an atom, ion, molecule (element or compound), and ionic compound.
- Distinguish Between Ionic and Covalent Compounds
  - There are two kinds of bonds: covalent and ionic.
  - Two kinds of compounds are covalent and ionic.
  - Compounds form from covalent bonds (molecules) or ionic bonds (ionic lattices).
  - Polyatomic ions are formed from covalent bonds but are connected to other ions by ionic bonds.