15 WRITING CHEMICAL EQUATIONS

Write unbalanced chemical equations for the following chemical reactions.
(Assume pure substances unless otherwise indicated. Include states of matter.)
Example: sodium metal + chlorine → sodium chloride
Answer: $Na_{(s)} + Cl_{2(g)} \rightarrow NaCl_{(s)}$

1. water → hydrogen + oxygen

2. nitrogen + hydrogen → ammonia

3. sulfuric acid + aqueous sodium hydroxide → water + aqueous sodium sulfate

4. aluminum + aqueous copper(II) nitrate → copper + aqueous aluminum nitrate

5. chlorine + aqueous potassium bromide → bromine + aqueous potassium chloride

6. lead(II) $nitrate_{(aq)}$ + sodium $iodide_{(aq)}$ → lead(II) $iodide_{(s)}$ + sodium $nitrate_{(aq)}$

7. aqueous sodium hydroxide + aqueous aluminum sulfate →
   solid aluminum hydroxide + aqueous sodium sulfate

8. phosphorus + oxygen → solid tetraphosphorus decaoxide

9. methanol + oxygen → carbon dioxide + water vapor

10. nitrogen dioxide gas + water → nitric acid + nitrogen monoxide gas

19 TRANSLATING INTO BALANCED CHEMICAL EQUATIONS

Translate each of the following chemical reactions into a complete, balanced chemical equation using international symbols and including states of matter at SATP. Assume pure states of matter unless otherwise indicated.

1. The reaction of magnesium and oxygen to form magnesium oxide is used to produce light in disposable flash bulbs.

2. Chlorine gas reacts with an aqueous solution of sodium iodide. Experimental evidence indicates that the products are solid iodine and aqueous sodium chloride.

3. Solid sodium sulfate reacts with carbon to form solid sodium sulfide (used to produce synthetic fabrics) and carbon dioxide.

4. Sulfuric acid, spilled from a battery, reacts with baking soda to produce aqueous sodium sulfate, carbon dioxide gas, and water.

5. The roasting of zinc sulfide ore in a smelter involves the heating of the ore in the presence of oxygen to produce zinc oxide and sulfur dioxide gas.

6. Once the protective oxide coating is removed, aluminum metal reacts readily with water to form hydrogen and aluminum hydroxide.

Starting with nitrogen and hydrogen, millions of kilograms of ammonia are produced every year for use as a fertilizer. Use this information to answer the next three questions.

7. Communicate the balanced chemical equation using molecular models.

8. Communicate the balanced chemical equation using international symbols and states of matter at SATP.

9. Translate the balanced chemical equation of international symbols into a complete English sentence.