(d) Decomposition
(e) Neutralization
(f) Double replacement
(g) Single replacement
(h) Single replacement
(i) Double replacement
(j) Combustion

2. (a) $Al + F_2 \rightarrow AlF_3$
(b) $K + O_2 \rightarrow K_2O$
(c) $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$
(d) $C_6H_{12}O_4 + O_2 \rightarrow CO_2 + H_2O$
(e) $Rb_2O \rightarrow Rb + O_2$
(f) $Sr + F_2 \rightarrow SrF_2$
(g) $BaCl_2 + Pb(NO_3)_2 \rightarrow Ba(NO_3)_2 + PbCl_2$
(h) $AgNO_3 + K_2Cr_2O_7 \rightarrow KNO_3 + Ag_2Cr_2O_7$
(i) $Br_2 + NiI_3 \rightarrow NiI_3 + Br_2$
(j) $Cl_2 + Mg_3N_2 \rightarrow MgCl_2 + N_2$
(k) $HCl + Mo(OH)_2 \rightarrow MoCl_2 + H_2O$
(l) $Sn(OH)_2 + HClO_3 \rightarrow Sn(ClO_3)_2 + H_2O$
(m) $Al + CuI_2 \rightarrow AlI_3 + Cu$
(n) $Mg + FeF_2 \rightarrow MgF_2 + Fe$

3. (a) Decomposition
(b) Synthesis
(c) Neutralization
(d) Single replacement, combustion
(e) Combustion
(f) Double replacement, neutralization
(g) Single replacement

4. (a) Concentration
(b) Surface area
(c) Temperature
(d) Concentration
(e) Concentration
(f) Catalyst
(g) Surface area
(h) Concentration

Understanding Key Ideas

5. (a) Synthesis
$4Li + O_2 \rightarrow 2Li_2O$
(b) Single replacement
$3Mg + 2AlCl_3 \rightarrow 3MgCl_2 + 2Al$
(c) Combustion
$2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$
(d) Neutralization
$HCl + LiOH \rightarrow LiCl + H_2O$
(e) Decomposition
$2Al_2O_3 \rightarrow 4Al + 3O_2$
(f) Single replacement
$3Sn + 4Au(NO_3)_3 \rightarrow 3Sn(NO_3)_4 + 4Au$
(g) Double replacement
$2Ba(OH)_2 + PbBr_4 \rightarrow 2BaBr_2 + Pb(OH)_4$
(h) Combustion
$2C_3H_8O_3 + 7O_2 \rightarrow 6CO_2 + 8H_2O$
(i) Synthesis
$N_2 + 2O_2 \rightarrow 2NO_2$

6. Reaction systems that do not have a surface, such as between two gases or between two liquids that completely mix into each other, are not affected by surface area considerations. If the reaction system has two or more distinct regions, such as a solid placed in a liquid, then there is a surface and surface area is a factor.

Applying Your Understanding

7. Surface area > temperature > concentration

Pause and Reflect Answer

Students' answers may include some of these points.

- Kitchen chemistry involves reaction rates: heating speeds up the decomposition of foods, while cooling slows it down.
- The reaction of gasoline with air in a car's engine is sped up by increasing the temperature inside the engine. A catalytic converter in the automobile's exhaust system speeds the decomposition of air pollutants leaving the engine.