FIGURE 11 Calcium hydride, CaH_2, reacts vigorously with water to produce hydrogen gas.

$$CaH_2(s) + 2H_2O(l) \longrightarrow Ca(OH)_2(aq) + 2H_2(g)$$

$$\underset{\text{acid}_1}{H_2SO_4(aq)} + \underset{\text{base}_2}{H_2O(l)} \longrightarrow \underset{\text{acid}_2}{H_3O^+(aq)} + \underset{\text{base}_1}{HSO_4^-(aq)}$$

However, water acts as an acid in the following reaction.

$$\underset{\text{base}_1}{NH_3(g)} + \underset{\text{acid}_2}{H_2O(l)} \rightleftharpoons \underset{\text{acid}_1}{NH_4^+(aq)} + \underset{\text{base}_2}{OH^-(aq)}$$

Thus, water can act as either an acid or a base and is amphoteric. Such a substance acts as either an acid or a base depending on the strength of the acid or base with which it is reacting. For example, if water reacts with a compound that is a stronger acid than water, water acts as a base. If water reacts with a molecule that is a weaker acid than water, water will act as an acid and the other molecule will act as a base.

FIGURE 12 Each oxyacid of chlorine contains one chlorine atom and one hydrogen atom. They differ in the number of oxygen atoms they contain. The effect of the changing O–H bond polarity can be seen in the increasing acid strength from hypochlorous acid to perchloric acid.