SOLUTION

a. This is a reaction between a metal and water at 50°C. Zinc reacts with water only when it is hot enough to be steam. Therefore, no reaction will occur.

b. Any metal more active than silver will react with oxygen to form an oxide. Tin is above silver in the activity series. Therefore, a reaction will occur, and the product will be a tin oxide, either SnO or SnO_2.

c. An element will replace any element below it in the activity series from a compound in aqueous solution. Cadmium is above lead, and therefore a reaction will occur to produce lead, Pb, and cadmium nitrate, $Cd(NO_3)_2$.

d. Any metal more active than hydrogen will replace hydrogen from an acid. Copper is not above hydrogen in the series. Therefore, no reaction will occur.

PRACTICE

Answers in Appendix E

1. Using the activity series shown in **Table 3,** predict whether each of the possible reactions listed below will occur. For the reactions that will occur, write the products and balance the equation.

   a. $Cr(s) + H_2O(l) \longrightarrow$ _____

   b. $Pt(s) + O_2(g) \longrightarrow$ _____

   c. $Cd(s) + 2HBr(aq) \longrightarrow$ _____

   d. $Mg(s) + \text{steam} \longrightarrow$ _____

2. Identify the element that replaces hydrogen from acids but cannot replace tin from its compounds.

3. According to **Table 3,** what is the most-active transition metal?

extension

Go to **go.hrw.com** for more practice problems that deal with activity series.

Keyword: HC6RXNX

SECTION REVIEW

1. How is the activity series useful in predicting chemical behavior?

2. Based on the activity series, predict whether each of the following possible reactions will occur:

   a. $Ni(s) + H_2O(l) \longrightarrow$ _____

   b. $Br_2(l) + KI(aq) \longrightarrow$ _____

   c. $Au(s) + HCl(aq) \longrightarrow$ _____

   d. $Cd(s) + HCl(aq) \longrightarrow$ _____

   e. $Mg(s) + Co(NO_3)_2(aq) \longrightarrow$ _____

3. For each of the reactions in item 2 that will occur, write the products and balance the equation.

Critical Thinking

4. **PREDICTING OUTCOMES** A mixture contains cobalt metal, copper metal, and tin metal. This mixture is mixed with nickel nitrate. Which metals, if any, will react? Write the chemical equation for any reaction.