

## Chapter 8

### Single Replacement Reactions

Single replacement reactions are reactions that involve an element replacing one part of a compound. The products include the displaced element and a new compound. An element can only replace another element that is less active than itself.

#### General activity series for metals

(most active)      Li Ca Na Mg Al Zn Fe Pb [H<sub>2</sub>] Cu Ag Pt      (least active)

#### General activity series for nonmetals

(most active)      F<sub>2</sub>      Cl<sub>2</sub>      Br<sub>2</sub>      I<sub>2</sub>      (least active)

Here are some common types of single replacement reactions.

*Active metals replace less active metals from their compounds in aqueous solution.*

example    Magnesium turnings are added to a solution of iron(III) chloride.



*Active metals replace hydrogen in water.*

example    Sodium is added to water.



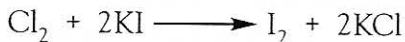
*Active metals replace hydrogen in acids.*

example    Lithium is added to hydrochloric acid.



*Active nonmetals replace less active nonmetals from their compounds in aqueous solution.*

example    Chlorine gas is bubbled into a solution of potassium iodide.



If a less reactive element is combined with a more reactive element in compound form, there will be no resulting reaction.

example    Chlorine gas is bubbled into a solution of potassium fluoride.



example    Zinc is added to a solution of sodium chloride.



## ROUND 3

**Exercise 8–1:** Using the activity series, predict and balance the following single replacement reactions. Use abbreviations to indicate the appropriate phase of reactants and products where possible.

*Note: Not all of the reactions will occur. For those that do not, write no reaction.*

1. A piece of copper is dropped into a container of water.
2. Liquid bromine is added to a container of sodium iodide crystals.
3. An aluminum strip is immersed in a solution of silver nitrate.
4. Zinc pellets are added to a sulfuric acid solution.
5. Fluorine gas is bubbled into a solution of aluminum chloride.
6. Magnesium turnings are added to a solution of lead(II) acetate.
7. Iodine crystals are added to a solution of sodium chloride.
8. Calcium metal is added to a solution of nitrous acid.
9. A pea-sized piece of lithium is added to water.
10. A solution of iron(III) chloride is poured over a piece of platinum wire.

*Note:* On the AP reaction prediction section, all reactions “work”; in other words there will be no “No reactions” on the AP Exam.