TABLE 8-3
ACTIVITY SERIES OF THE ELEMENTS

Activity of Metals	
Li, Rb, K, Ba, Sr, Ca, Na	Can react with cold H_2O and acids, replacing hydrogen.
Mg, Al, Mn, Zn, Cr, Fe, Cd	Can react with steam and acids, replacing hydrogen.
Co, Ni, Sn, Pb	Can react with acids, replacing hydrogen.
H_2, Sb, Bi, Cu, Hg	React with oxygen, forming oxides.
Ag, Pt, Au	Fairly unreactive. Form oxides only indirectly.

Activity of Halogen Nonmetals
F_2, Cl_2, Br_2, I_2

Single Replacement ONLY

- **FREE element must be _____on the chart to replace in the compound.**
- **The more _____ element is higher on the chart**

Forming Metal Hydroxides

Forming Metal Oxides

NOT GIVEN
Group 17 on PT

3. In each of the following pair, identify the more-active element.
   (a) _____ F_2 & I_2
   (b) _____ Mn & K
   (c) _____ Cu & H

4. $Al + HC_2H_3O_2 \rightarrow$

   Look up _____ & _____ on Activity series. _____ is higher. _____

5. $Al + H_2O \xrightarrow{50°C}$

   Look up _____ & _____ on Activity series. _____ is higher. _____

6. $Cr + CdCl_2 \rightarrow$

   Look up _____ & _____ on Activity series. _____ is higher. _____

7. $Br_2 + KCl \rightarrow$

   Look up _____ & _____ on Periodic Table. _____ is higher. _____

Reaction Guide

Synthesis Reactions $A + B \rightarrow AB$ (one product)

- Reaction whereby two or more substances combine to from a new compound.
- More than One → One Product
- Elements react with oxygen (O_2) to form oxides.
- Two nonmetals react to form a molecular compound.
- Metals and nonmetals react to form an ionic compound.

  Special Synthesis:
  - **Metal oxides** react with **carbon dioxide** to produce *metal carbonates.*
  - **Metal oxides** react with **water** to produce *metal hydroxides.*
  - **Metal oxides** react with **sulfur trioxide** to produce *metal sulfates*.
  - **Non-metal oxide** react with **water** to produce *oxy-acids*
  - **Metal chloride** reacts with **oxygen** to produce a *metal chlorate*

Decomposition Reactions $AB \rightarrow A + B$ (one reactant)

- Reaction whereby one substance is broken down into two or more new compounds.
- One Reactant → More than One
- *Binary* compounds (those with only two elements) decompose into their individual elements when exposed to heat or electricity.

  Special Decomposition:
  - *Metal carbonates* decompose into a **metal oxide** and **carbon dioxide**.
  - *Metal hydroxides* decompose into a **metal oxide** and **water**.
  - *Metal chlorates* decompose into **metal chlorides** and **oxygen**.
  - *Hydrates* decompose into **anhydrous salt** and **water**.
  - *Oxy-acids* decompose into **non-metal oxides** and **water** (non-metal has the same ox #)

Double Replacement Reactions $AB + CD \rightarrow AD + CB$ (two compounds)

Reaction whereby the ions of 2 compounds exchange places in an aqueous solution to form two new compounds.

Single Replacement Reactions

$C + AB \rightarrow CB + A$ (C and A are metals) $D + AB \rightarrow AN + B$ (D and B are nonmetals) (element + compound)

- A reaction whereby a **more reactive element** replaces a similar less reactive element in a compound.
- Metals replace metals. Nonmetals replace nonmetals.
- To see if the reaction occurs, use the activity series (in your reaction guide). The more reactive element will be the one found in the compound.
- Hydrogen in an acid can be replaced by MOST metals- see activity series.

Combustion Reactions $C_xH_y + O_2 \rightarrow CO_2 + H_2O$

- Reaction where a substance (usually hydrocarbon) reacts with oxygen (O_2) to form an oxide.