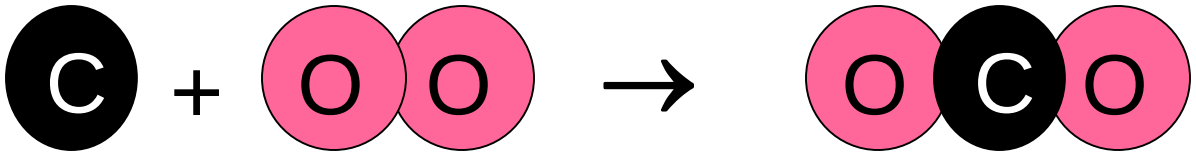
Types of Reactions

1. Synthesis reactions
2. Decomposition reactions
3. Single displacement reactions
4. Double displacement reactions
5. Combustion reactions

You need to be able to identify each type.

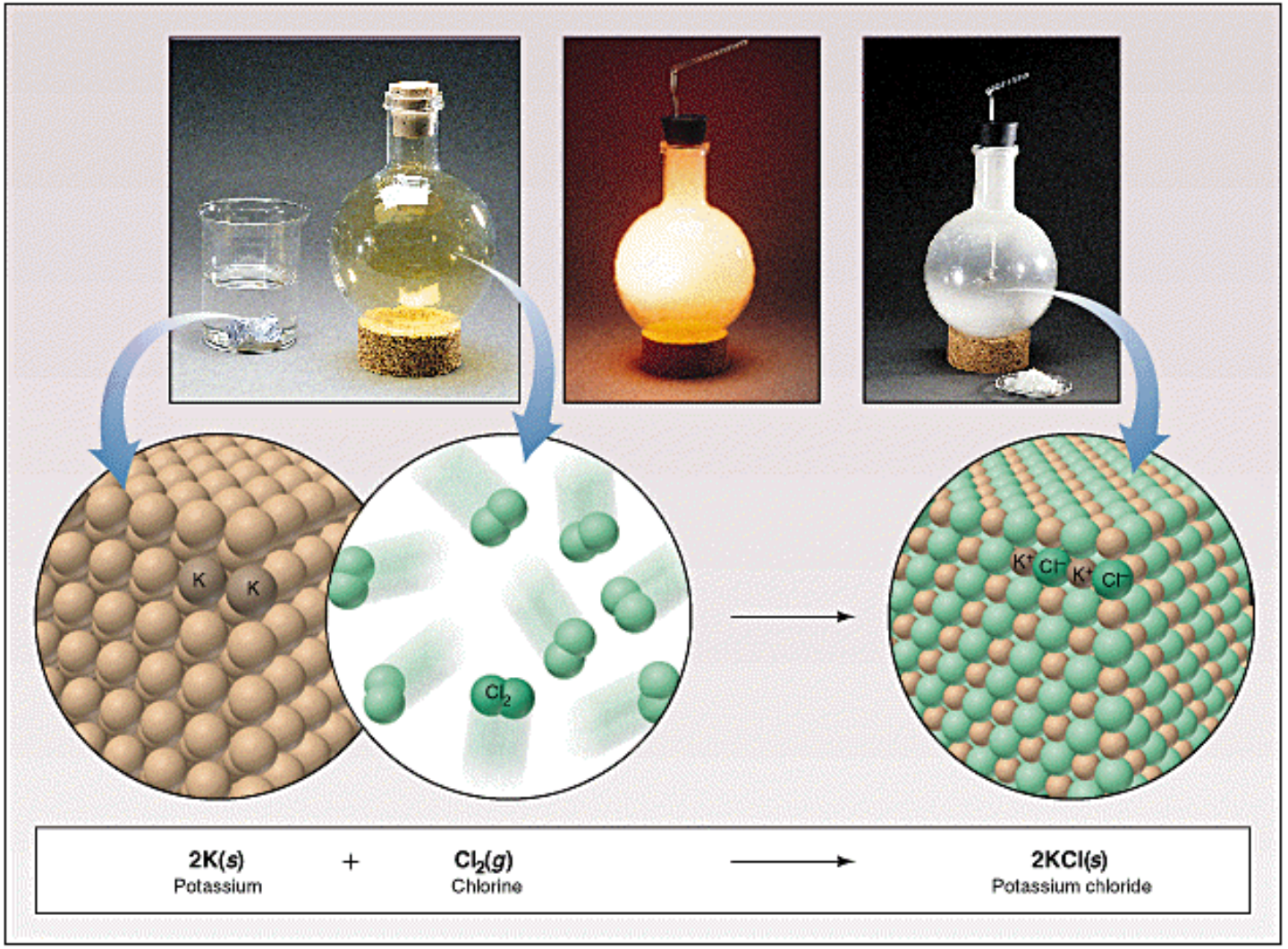
1. Synthesis

Example $C + O_2$



General: $A + B \rightarrow AB$

Ex. Synthesis Reaction



Practice

- Predict the products.

$2\ Na_{(s)} + Cl_{2(g)} \rightarrow 2\ NaCl_{(s)}$

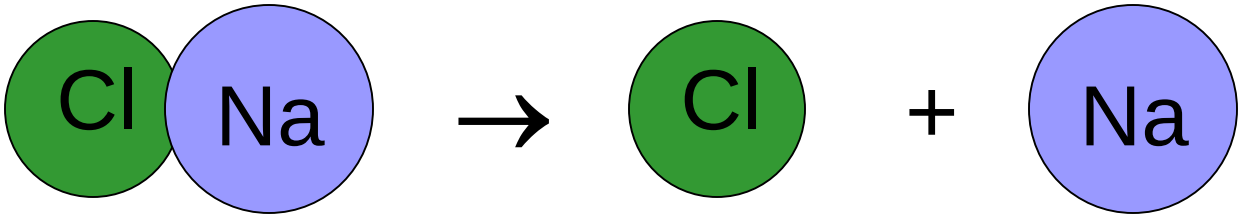
$Mg_{(s)} + F_{2(g)} \rightarrow MgF_{2(s)}$

$2\ Al_{(s)} + 3\ F_{2(g)} \rightarrow 2\ AlF_{3(s)}$

- Now, balance them.

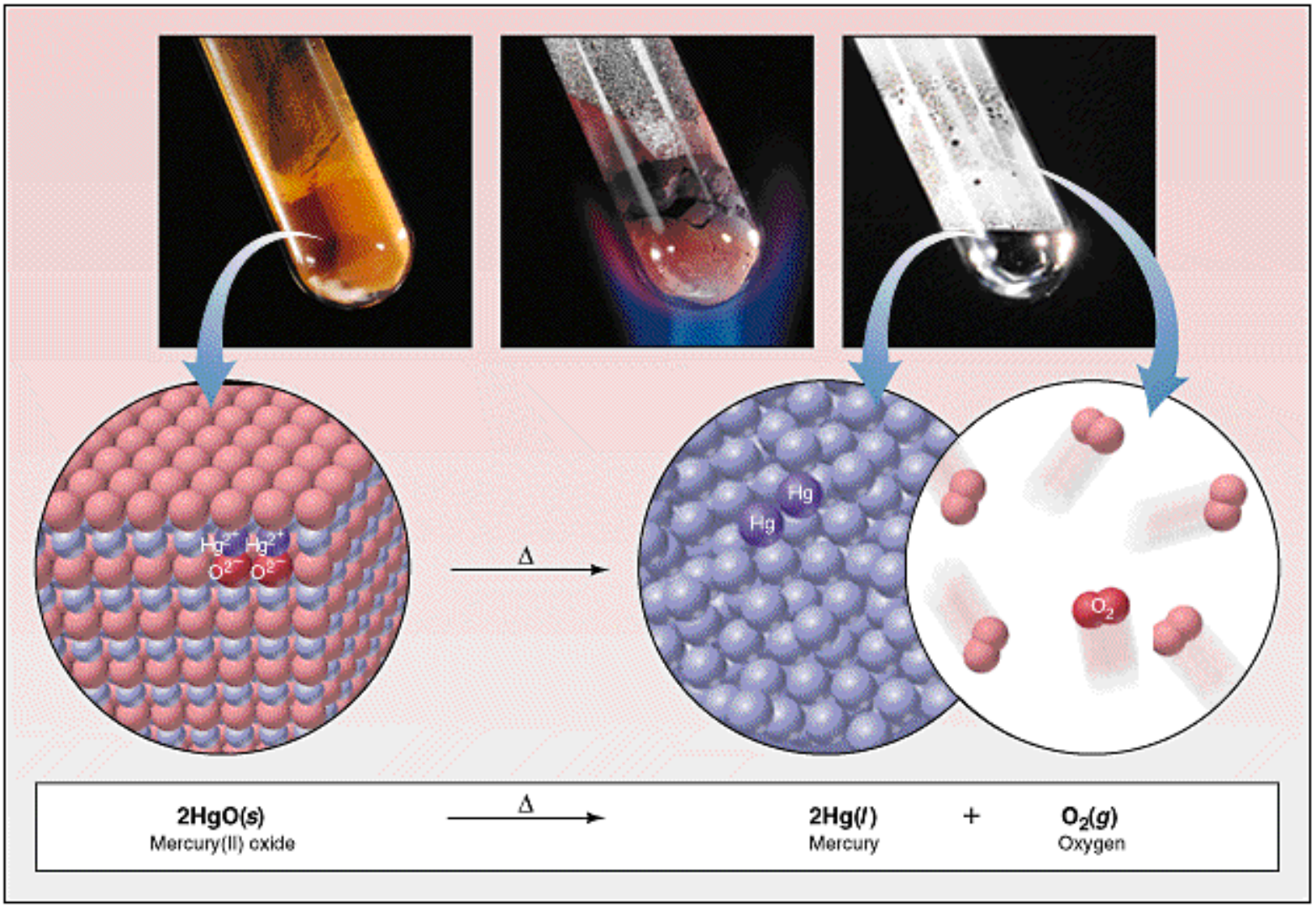
2. Decomposition

Example: NaCl



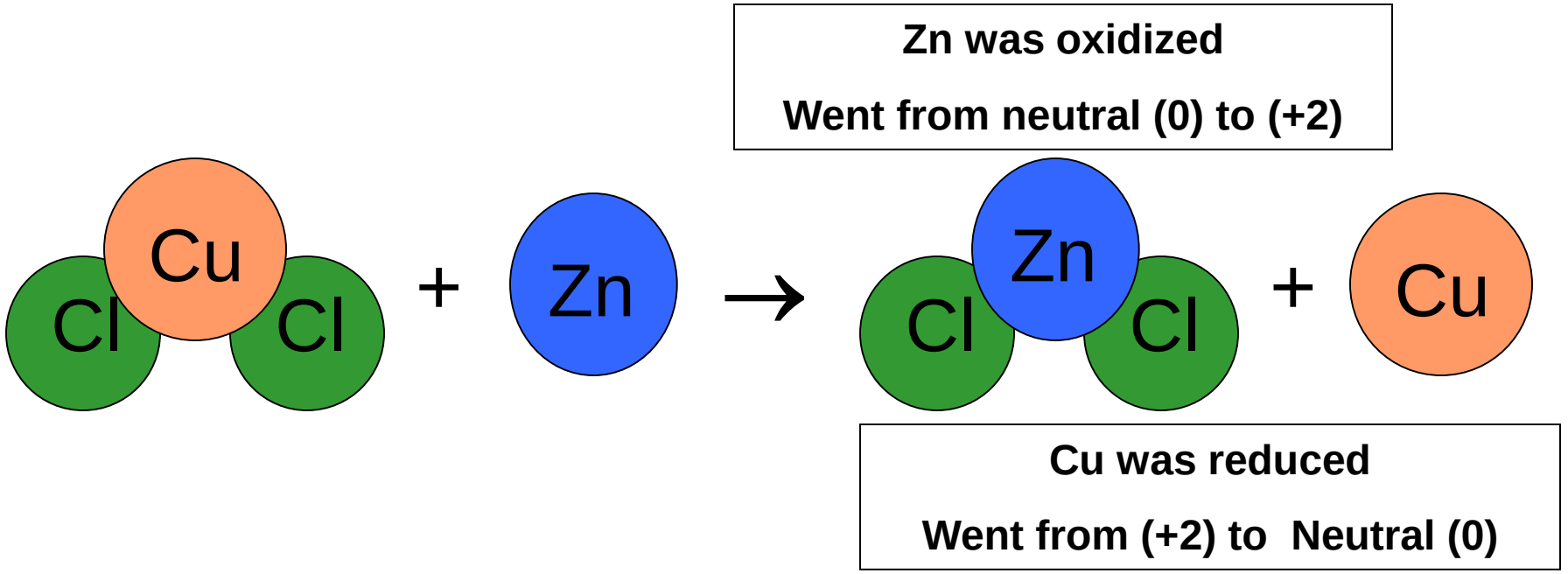
General: $AB \rightarrow A + B$

Ex. Decomposition Reaction



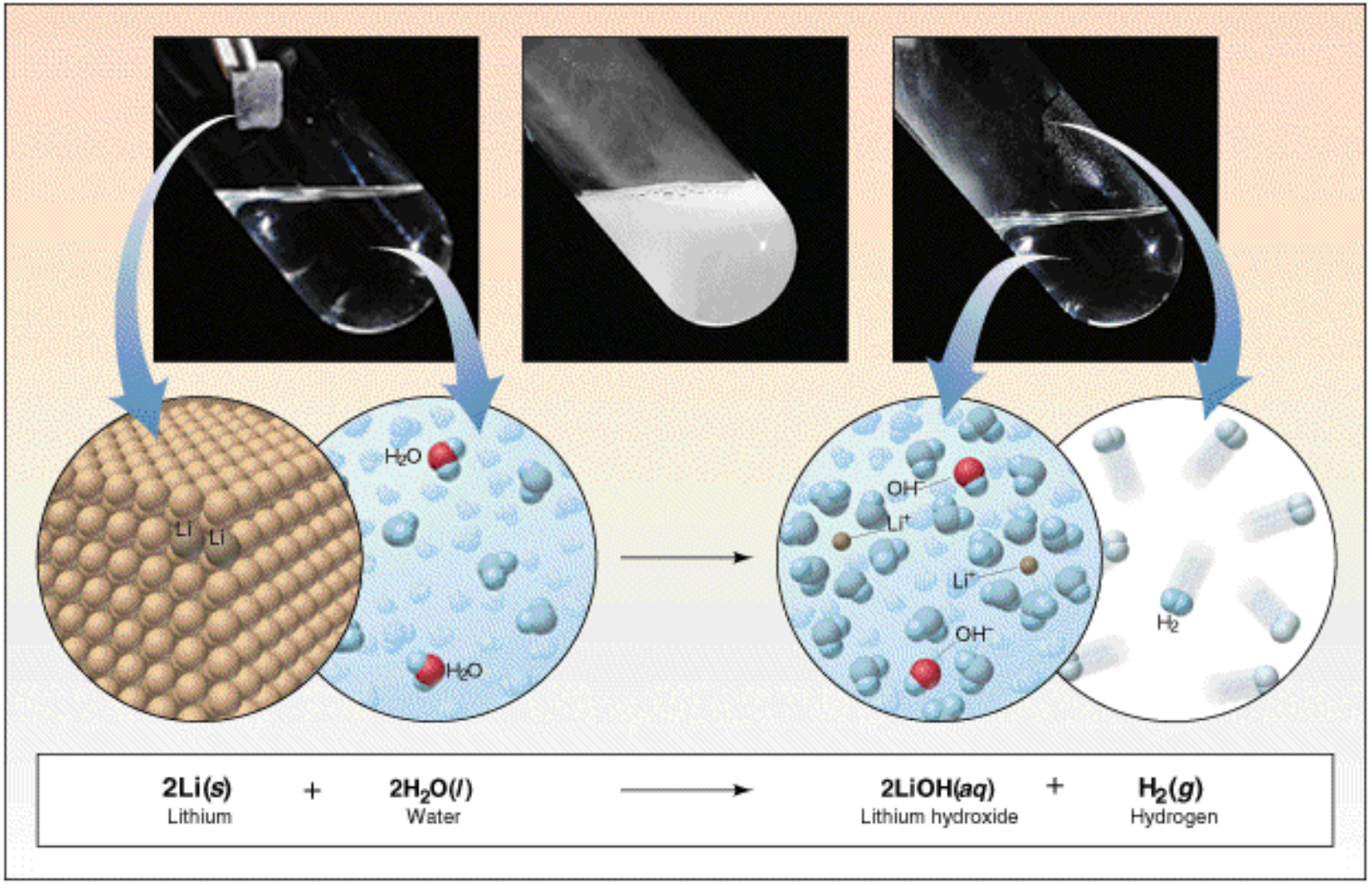
3. Single Displacement

Example: $Zn + CuCl_2$



General: $AB + C \rightarrow AC + B$

Ex. Single Replacement Reaction



Single Replacement Reactions

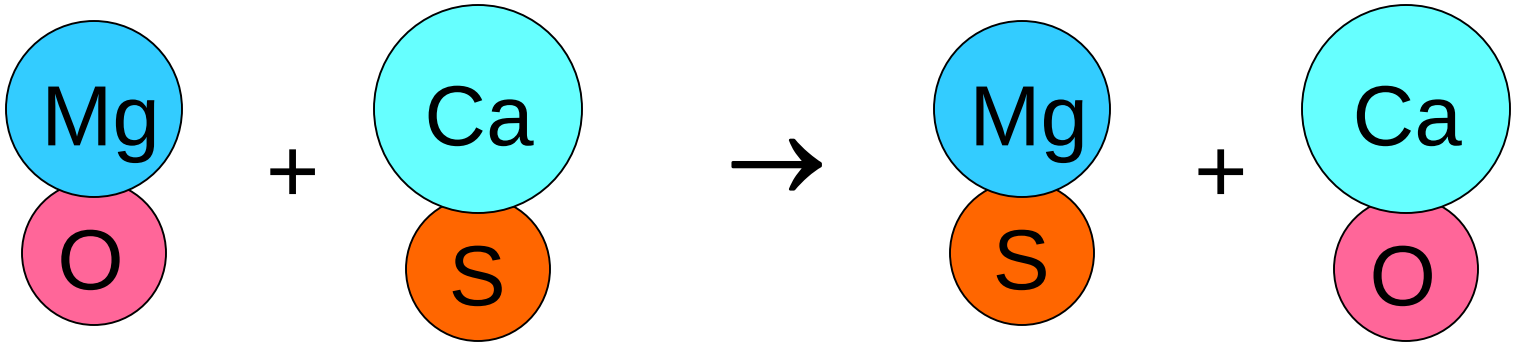
- Write and balance the following single replacement reaction equation:
- $Zn_{(s)} + 2\,HCl_{(aq)} \rightarrow ZnCl_2 + H_{2(g)}$

- $2\,NaCl_{(s)} + F_{2(g)} \rightarrow 2\,NaF_{(s)} + Cl_{2(g)}$

- $2\,Al_{(s)} + 3\,Cu(NO_3)_{2(aq)} \rightarrow 3\,Cu_{(s)} + 2\,Al(NO_3)_{3(aq)}$

4. Double displacement

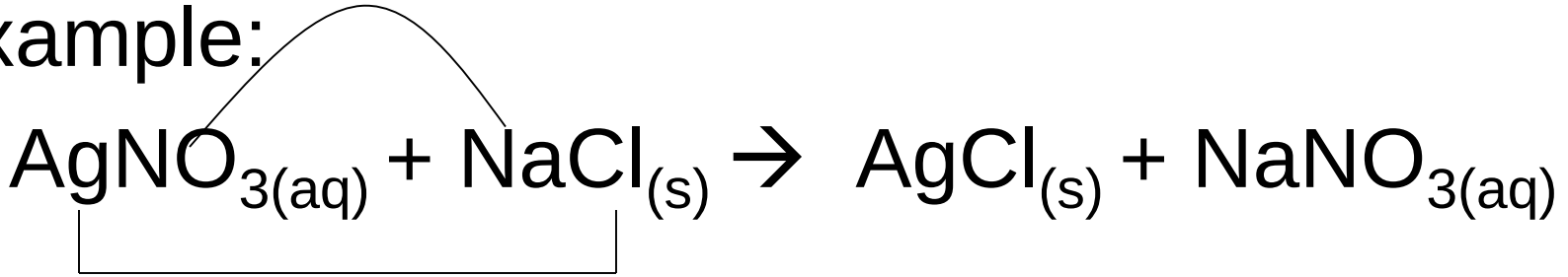
Example: MgO + CaS



General: $AB + CD \rightarrow AD + CB$

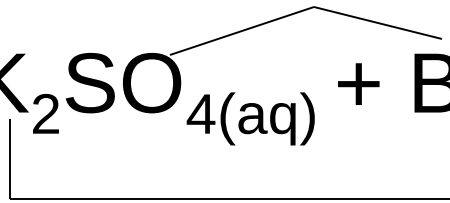
Double Replacement Reactions

- Think about it like “foil”ing in algebra, first and last ions go together + inside ions go together
- Example:



$$AgNO_{3(aq)} + NaCl_{(s)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$$

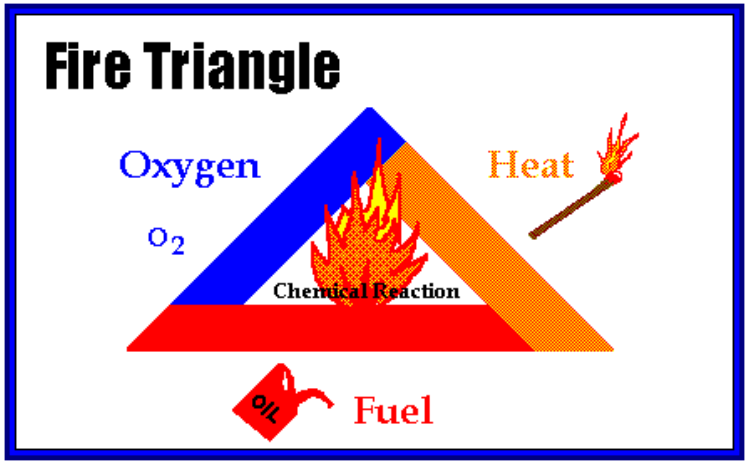
- Another example:



$$K_2SO_{4(aq)} + Ba(NO_3)_{2(aq)} \rightarrow 2\,KNO_{3(aq)} + BaSO_{4(s)}$$

5. Combustion Reactions

- **Combustion reactions -** a hydrocarbon reacts with oxygen gas.
- This is also called burning!!!
- In order to burn something you need the 3 things in the “fire triangle”:

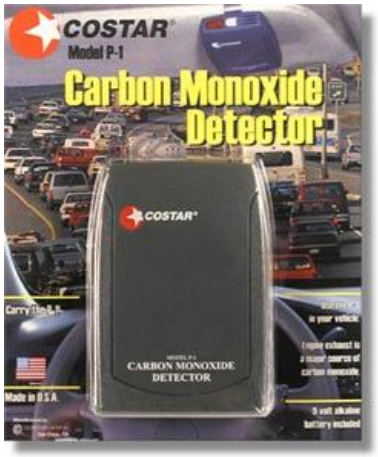


- 1) Fuel (hydrocarbon)
  2) Oxygen
  3) Something to ignite the reaction (spark)

Combustion Reactions

- In general:
  $C_xH_y + O_2 \rightarrow CO_2 + H_2O$
- Products are ALWAYS

  carbon dioxide and *water*.
  (although incomplete burning does cause some by-products like carbon monoxide)
- Combustion is used to heat homes and run automobiles (octane, as in gasoline, is C_8H_{18})



Mixed Practice

- State the type & predict the products.

1. $BaCl_2 + H_2SO_4 \rightarrow$
2. $C_6H_{12} + O_2 \rightarrow$
3. $Zn + CuSO_4 \rightarrow$
4. $Cs + Br_2 \rightarrow$
5. $FeCO_3 \rightarrow$