

Reaction Prediction Types

Decomposition

How do you recognize a decomposition reaction?

You always have ONE compound as the reactant.

1 compound \rightarrow two other substances

Choices:

1 compound \rightarrow two compounds

Metallic carbonate \rightarrow CO₂ + metallic oxide

Metallic hydroxide \rightarrow H₂O + metallic oxide

Exceptions: KOH & NaOH are stable and do not decompose.

Oxyacid \rightarrow H₂O + nonmetallic oxide

1 compound \rightarrow 1 element + 1 compound

Metallic chlorate \rightarrow O₂ + metallic chloride

1 compound \rightarrow 1 element + 1 element

Metallic oxide \rightarrow metal + O₂

Water (electrolysis) \rightarrow H₂ + O₂

Metallic halide \rightarrow metal + halogen

Composition = Synthesis

How do you recognize a synthesis reaction?

You always have two substances as reactants:

1 element + 1 element \rightarrow

1 element + 1 compound \rightarrow

1 compound + 1 compound \rightarrow

Also note that your product will be the same as the “reactant” of a *decomposition* reaction.

Look at Activity Series Reference Sheet – see especially #4 (Gold and Platinum do *NOT* combine with O₂).

Double Replacement

How do you recognize a double replacement reaction?

You have two ionic compounds as reactants OR an acid plus a base as reactants.

AB + XY \rightarrow AY + XB

Always write charges on ionic compounds!

Acid + Base \rightarrow H₂O + ionic compound

Use your acids and bases reference sheet to determine formula for acid and base.

Combustion

How do you recognize a combustion reaction?

You always have an organic compound (containing C and H) reacting with oxygen.

C_xH_y + O₂ \rightarrow CO₂ + H₂O

Single Replacement

How do you recognize a single replacement reaction?

You always have one element reacting with one compound as reactants.

element + compound \rightarrow element + compound

Always look at your Activity Series Reference Sheet! This is critical for all single replacement reactions!

Choices:

- Halogen trying to replace the halogen in the compound
The halogen doing the replacing in the compound must be more active.
- Metal trying to replace the metal in the compound
The metal doing the replacing in the compound must be more active.
- Metal + acid \rightarrow H₂ + compound (but, metal must be above hydrogen on the Activity Series Sheet)
- Group A Metal + water \rightarrow H₂ + metallic hydroxide
- Group B Metal + water \rightarrow H₂ + metallic oxide
- Group C Metal + water \rightarrow no reaction