

REACTION TYPES

Chem 111

SYNTHESIS REACTIONS: Page 330 & 331

- 2 or more substances react to form a single substance (always 1 product).
- usually release energy.
- often 2 non-metals combine in more than one way & you will be told the product.
- other synthesis
 - water + non-metal oxide \rightarrow acid $H_2O(l) + SO_2(g) \rightarrow H_2SO_4$
 - water + metal oxide \rightarrow metal hydroxide $H_2O(l) + CaO(s) \rightarrow Ca(OH)_2(s)$

Decomposition Reactions: Page 332 & 338

- opposite of synthesis
- a compound breaks down into 2 or more substances.
- most require energy.
- other decomposition
 - metal chlorates \rightarrow metal chlorides + oxygen gas $KClO_3(s) \rightarrow KCl(s) + O_2(g)$
 - metal carbonates \rightarrow metal oxide + carbon dioxide $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

11.2: CLASSIFYING REACTIONS

ACTIVITY SERIES

- ↓
 Li K Ca Na Mg Al Zn Fe Pb H Cu Hg Ag
 ↓
 decreasing reactivity

Single Replacement Reactions: Page 333 & 338

- one element will replace another element in a compound.
- Use the activity series to predict if reaction will occur.
- See activity series Pg. 333. - a metal will replace another metal below it.
- halogens - a halogen will replace any halogen listed below it on periodic table.
- ex $NaCl(aq) + Br_2(l) \rightarrow$ no reaction (because cannot replace it)
- $MgBr_2(aq) + Fe(s) \rightarrow MgCl_2(aq) + Br_2(l)$
- $Zn(s) + 2CuNO_3 \rightarrow Zn(NO_3)_2 + 2Cu(s)$
- $2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + H_2(g)$

Double Displacement Reactions: Page 334 & 339

- Ions of 2 compounds exchange places in an aqueous solution to form 2 new compounds.
- May result in
 - production of precipitate.
 - production of gas.
 - production of water.
- Types - Neutralization
 - acid + base react to form salt + water.
- Precipitation
 - 2 aqueous solutions combine and produce a solid (s)
 - $NaCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

Combustion Reactions: Page 336 & 339

- Burning of a substance w/ sufficient oxygen to produce oxides.
- often produces energy
- common oxides:
 - carbon $\rightarrow CO_2$
 - hydrogen $\rightarrow H_2O$
 - Sulfur $\rightarrow SO_2$
 - nitrogen $\rightarrow NO_2$
 - metal \rightarrow metal oxide