

Reactions and Stoichiometry

①

Chemical reactions - reactants \rightarrow products

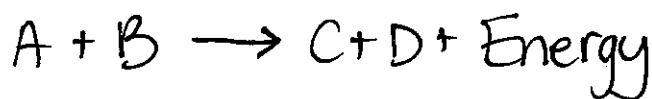
\hookrightarrow result of a chemical change due to something new being formed

- # of atoms are same for reactants/products
not molecules/phases/compounds etc.

* Exothermic and Endothermic Reactions

\hookrightarrow heat
exits

\hookrightarrow heat
enters



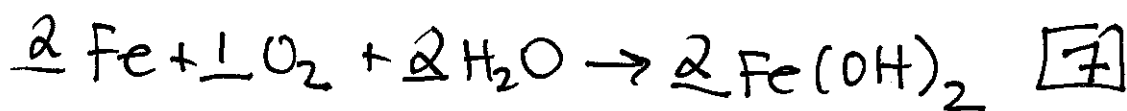
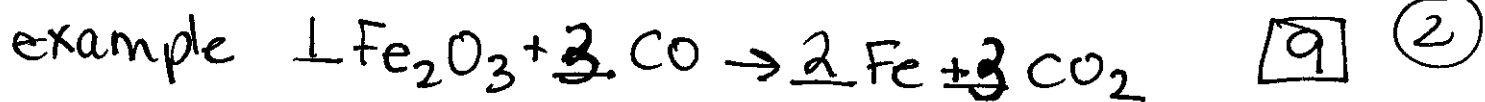
Ref. Table I to determine exo vs endo

Balancing Reactions

- hints:

1) if an atom is present in odd quantity, try to multiply by a number to make it even

2) start with any atoms that only occur in one compound



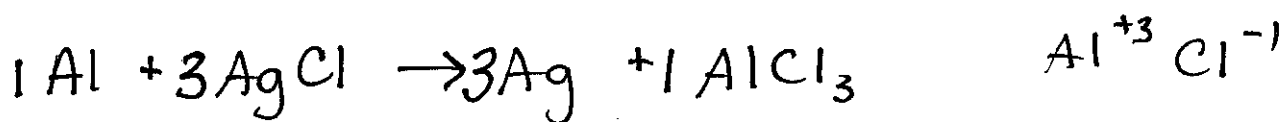
Reaction Types

1. Synthesis $\rightarrow A + B \rightarrow C$ [1 product only]

2. Decomposition $\rightarrow C \rightarrow A + B$ [1 reactant \rightarrow ²⁺ products]

3. Single Replacement

* Table J - make sure that metal being replaced is less active than one taking its place



$\text{Cu} + \text{NaF} \rightarrow$ won't proceed b/c cu is less reactive than Na according to table J.

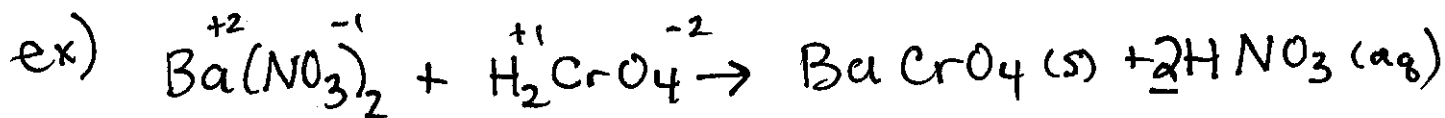
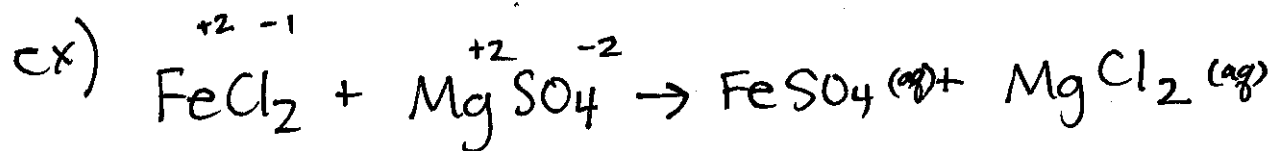
4. Double Replacement

(9)(3)

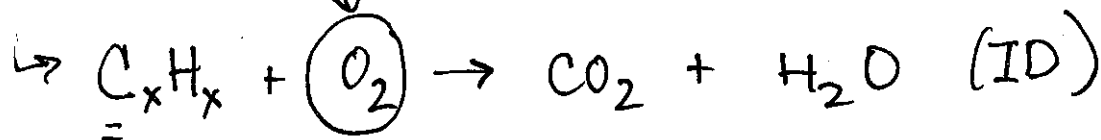
★ Table F (Solubility Tables)



use Table F
to determine
(aq) or (s)

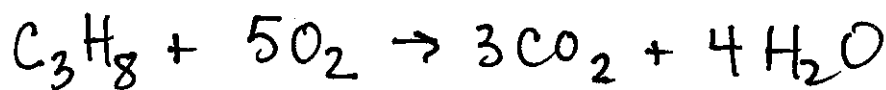


5. Combustion



Reactions and Mass

conservation of mass = mass @ beginning
of reaction should be the same @ end of
the reaction



$$2.3\text{g} + 0.50\text{g} = \frac{?}{1.6\text{g}} + 1.2\text{g}$$

$$\underbrace{\hspace{10em}}_{2.8}$$

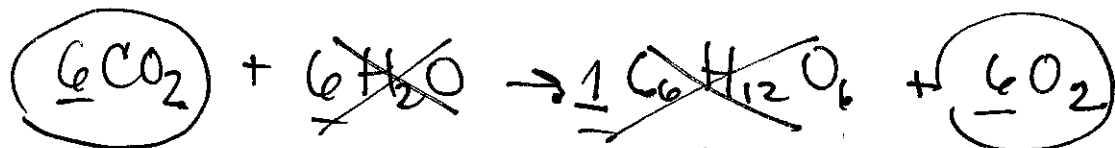
ignore
coefficients

Stoichiometry

(4) (5)

- relationship between moles of reactants vs. moles of products

* use dimensional analysis



? → How much O₂ would be produced if 2.3 moles of CO₂ were used?

↓

start: $2.3 \text{ mol CO}_2 \times \frac{6 \text{ mol O}_2}{6 \text{ mol CO}_2} = 2.3 \text{ mol O}_2$

? mol of C₆H₁₂O₆ if 3.9 mol H₂O?

$$3.9 \text{ mol } \cancel{\text{H}_2\text{O}} \times \frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{6 \text{ mol } \cancel{\text{H}_2\text{O}}} = \boxed{0.65 \text{ mol C}_6\text{H}_{12}\text{O}_6}$$

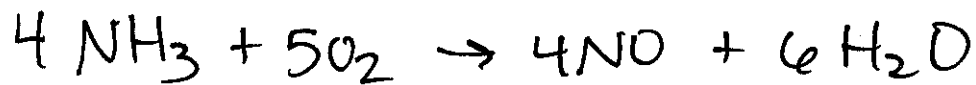


? NH₃. if use 7.5 mol O₂

$$\begin{array}{l} \text{start} \quad \quad \quad \text{end} \\ \frac{4 \text{ mol NH}_3}{5 \text{ mol O}_2} = \frac{x \text{ mol NH}_3}{7.5 \text{ mol O}_2} \end{array}$$

$$\frac{5x}{5} = \frac{4(7.5)}{5}$$

x =



5

? g of NO are produced from 2 mole NH_3

1st - Find moles of NO

2nd - Use Gram formula mass to convert to grams

$$\rightarrow 2 \text{mol } \text{NH}_3 \times \frac{4 \text{ mol NO}}{4 \text{ mol } \text{NH}_3} = 2 \text{ mol NO}$$

$$2 \text{ mol NO} \times \frac{30.0 \text{ g}}{1 \text{ mol NO}} = 60.0 \text{ g NO}$$