FORMULAE SHEET

General Balance Equation

ACCUMULATION=INPUT-OUTPUT+GENERATION-CONSUMPTION

Balance on Continuous Steady State Processes

INPUT+GENERATION =OUTPUT+CONSUMPTION

Limiting Reactant: A reactant is limiting if it is present in less than its stoichiometric proportion relative to every other reactant**.**

Fractional Excess: Fractional Excess = $\frac{n - n_s}{n_s}$**,**

where n is the amount of the limiting reactant fed and n_s is the stoichiometric amount**.**

Percentage Excess: Percentage Excess = 100 * Fractional Excess

Fractional Conversion: $$f = \frac{moles\ reacted}{moles\ fed}$$

Percentage Conversion: Percentage Conversion = 100 * f

Yield: $$\text{YIELD} = \frac{\text{Moles of desired product formed}}{\text{Moles that would have been formed if there were no side reactions and the limiting reactant had reacted completely}}$$

Selectivity: $$\text{SELECTIVITY} = \frac{Moles\ of\ desired\ product\ formed}{Moles\ of\ undesired\ product\ formed}$$

Theoretical Amount of Oxygen: The moles (batch) or molar flow rate (continuous) of O_2 needed for complete combustion of all the fuel fed to the reactor, assuming that all carbon in the fuel is oxidized to CO_2 and all hydrogen is oxidized to H_2O.

Theoretical Amount of Air: The quantity of air that contains the theoretical oxygen.

Percent Excess Oxygen: $$= \left(\frac{(oxygen)_{fed} - (oxygen)_{theoretical}}{(oxygen)_{theoretical}} \right) * 100\%$$

Percent Excess Air: $$= \left(\frac{(moles\,air)_{fed} - (moles\,air)_{theoretical}}{(moles\,air)_{theoretical}} \right) * 100\%$$

Note that: Percent Excess Air = Percent Excess Oxygen