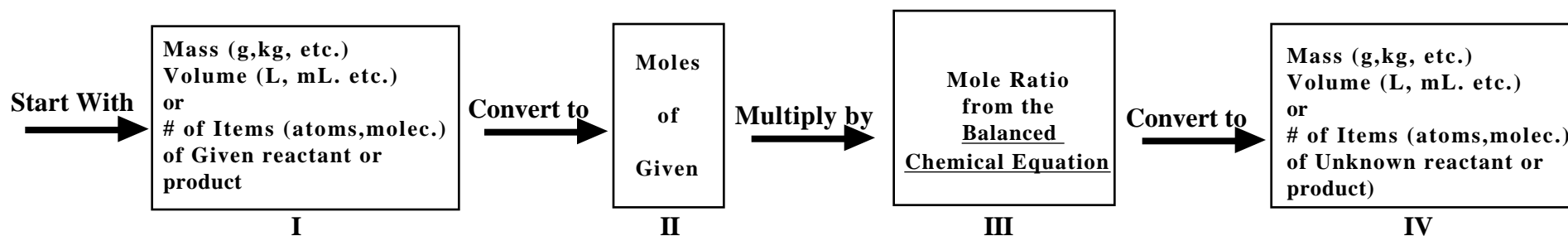


The Mathematics of Chemical Equations (Stoichiometry)

A major task of the chemist is to project how much product can be produced from a certain amount of reactant. The amount of product produced must have more value than the reactants plus the added cost of safely disposing of any waste product produced. The cost of the energy used in the reaction or the cost of disposing of any heat given off by the reaction must also be taken into consideration. A chemical engineer must be able to calculate the amounts of all reactants and products in order to determine if the process is economical. This type of calculation is called **stoichiometry**.

A flow chart for solving stoichiometry problems:

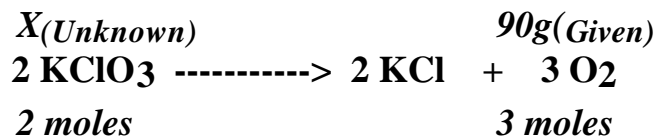


Sample Problem

What mass, in grams, of KClO_3 is consumed when 90 grams of O_2 is produced according to the following reaction:

At STP:

1 mole = 6.02×10^{23} items
1 mole(g) = 22.4 Liters



$$X = \frac{90\text{g O}_2}{32\text{g O}_2} \times \frac{1\text{ mole O}_2}{3\text{ moles O}_2} \times \frac{2\text{ mole KClO}_3}{1\text{ mole KClO}_3} \times 122.5\text{ g KClO}_3 = \boxed{229.7\text{ g KClO}_3}$$

I
II
III
IV