

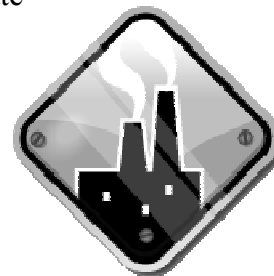
Student Name: _____ Pd. _____ Date: _____

Stoichiometry Mini Project 1

Industrial Production of Sulfuric Acid

Sulfuric acid is manufactured in greater quantities each year than any other compound in the chemical industry. The process involves three major steps:

1. Elemental sulfur (S_8) is burned in the presence of oxygen to generate sulfur dioxide gas;
2. Sulfur dioxide gas is allowed to react with oxygen gas from the atmosphere in the presence of a catalyst to form sulfur trioxide gas;
3. Sulfur trioxide gas is absorbed into sulfuric acid to form liquid oleum ($H_2S_2O_7$).
4. Oleum reacts with liquid water to form liquid sulfuric acid.



A certain chemical manufacturer intends to produce 2 million metric tons of sulfuric acid in its next fiscal year. To do so, the process engineers first identify some important information about their process:

1. The purest elemental sulfur available for purchase is 99.9% pure by mass.
2. The process of converting sulfur dioxide to sulfur trioxide is only 94% efficient (which means that only 94% of the sulfur dioxide becomes sulfur trioxide).
3. The reaction of oleum with water results in a loss of some sulfur trioxide gas, and so only 98.3% of it is converted to acid.
4. The sulfuric acid used in the third step is recycled from the process continuously (it can be considered in excess in this reaction).



Using this information, and any resources you have available to you, determine how many kilograms of elemental sulfur are required to produce the required amount of sulfuric acid.