

**CE 326 – Principles of Environmental Engineering
Laboratory Assignment # 1**

Materials Balance Calculations

1. Approximately 130,000 tons ($118 \cdot 10^6$ kg) of coal are burned each year at the Iowa State University Power Plant. The coal is barged up from Kentucky to Davenport and trucked to Ames. Kentucky coal typically has a 2% sulfur content. What would be the average daily output (in kg/d) of sulfur dioxide (SO_2) assuming that 4% of the sulfur content of the coal ends up in the ash (i.e. 4% of S is unreacted) and the rest is released in the stack gas?
2. Assuming that the remainder of the coal is essentially carbon, how much oxygen would be consumed per day in the reactions with coal? Express your results in both mass (kg/d) and volume (m^3/d) units.
3. As a rough approximation, the average oxygen content of dry air is about 21% by volume. If 20% excess air is used in the combustion process, how much air will be required each day?
4. What would be the concentration of SO_2 in the stack gas if no pollution control equipment is used? Calculate your result on both a mass (g/m^3) and volume (ppm) basis.