

CE 326 – Principles of Environmental Engineering

Materials Balance Calculations

1. Approximately 160,000,000 kg of coal are burned each year (438,000 kg/d) 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 of sulfur dioxide (SO_2) assuming that 6% of the sulfur content of the coal ends up in the ash (i.e. 6% 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 12% 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.

Due date: January 18, 2006