



Midterm #2

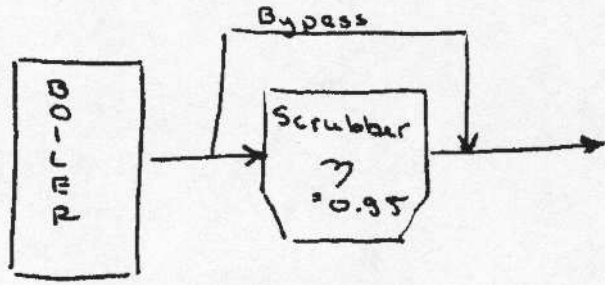
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EN 320
ENEV

Winter - 92

1. (10) If $8000 \text{ m}^3/\text{d}$ of waste water from an industry has a BOD_5 of 190 mg/l and $k_1 = 0.17$ per day, how much oxygen (kg/day) is required to satisfy the BOD demand of this waste, assuming that 1 kg of oxygen is to be supplied per kg of ultimate BOD in the waste.

2. (10) The diagram below illustrates a coal-fired power plant with an SO_2 scrubber with an efficiency of 95% . An overall efficiency of 85% is required. Rather than treat the entire system to 85% removal, the company proposes to treat part of the flue gas to 95% removal, and to bypass the remainder. The reblended stream must satisfy the overall removal efficiency, i.e., 85% . Calculate the fraction of flue gas that can be bypassed around the scrubber.



3. (10) Wind blows down a trapezoidal valley at 8 m/s . The valley depth is 800 m , the floor width is 1000 m , and the width at the top is 2000 m . A smelter emits SO_2 at a steady rate of 100 kg/day . The valley is capped by an inversion. Calculate the steady state concentration ($\mu\text{g}/\text{m}^3$) a long way down wind from the smelter, where the pollutant is uniformly spread across the width of the valley. State assumptions.

4. (10) Consider a smelter on open ground with an emissions rate of 100 kg/day . The stack is 200 m tall and the plume rise is 100 m . The wind is 4 m/s and the air is neutral. Estimate the centre line concentration on a 50 m hill, 6000 m directly down wind. State assumptions.

5. (10)
 - a) Why is stratospheric ozone a problem?
 - b) Why is organic waste a concern in water?
 - c) Name two physical properties of waste water commonly measured.