EVE 290
Introduction to Environmental Engineering

HW #2

2.9
A mass of 0.525 g of sodium chloride (NaCl) has been added to a cylinder containing water. The cylinder diameter is 1.5 inch and the depth of the water in the container is 5 inches. Determine the concentration of the sodium ion in solution, showing the result in (a) mg/L, (b) mass %, and (c) molarity. **Ans (a) 1426 mg/L (b) 0.143% (c) 0.062 M**

2.10
The sulfur dioxide (SO_2) stack-gas concentration from fossil-fuel combustion is 2 ppm_v. Determine the SO_2 concentration in units of mg/m^3. Assume 0°C and 1 atm pressure. **Ans: 5714 $\mu g/m^3$**

2.11
Calculate the volume of 1 mole of SO_2 at 25°C and 1 atm. Express your answer in m^3. **Ans: 0.025 m^3**

2.12
The smoke inhaled from a cigarette contains approximately 400 ppm_v carbon monoxide. Express this concentration as a percentage of air inhaled. **Ans: 0.04%**

2.14
A rigid cylinder with a volume of 25 L is filled with nitrogen gas to a final pressure of 20,000 kPa at 27°C. Determine the number of moles of N_2 gas the cylinder contains. **Ans: 200 moles**

2.15
A 1-kg block of dry ice (solid CO_2) vaporizes to gas at room temperature. Determine the volume of gas produced at 25°C and 975 kPa. **Ans: 57.8 L**

2.16
Assume the discharge from a wastewater treatment plant has a flow of 30 MGD with a solids concentration of 5 mg/L. Determine the mass flow rate of solids discharged in units of lb_m/day. **Ans: 1251 lb/day**

2.17
Consider a rectangular wastewater treatment cell having a length of 100 ft, width of 20 ft, and depth of 20 ft. If the flow into the cell is 50 ft^3/min, calculate the residence time of the treatment cell. **Ans: 800 minutes**