

**EVE 402**  
**Air Pollution Generation and Control**

**Homework #1**  
**Due: Friday, 30 August, 2019**

1. The ozone concentration [O<sub>3</sub>] sometimes reaches a value of 0.25 ppm over a 1-hr period in urban areas with photochemical smog problems. Determine by what percentage this level exceeds the pre-1997 national ambient standard of 240 μg/m<sup>3</sup> for the given time period, if the temperature is 25°C.
2. The primary air quality standard for NO<sub>x</sub> expressed as NO<sub>2</sub> as an annual average is 100 μg/m<sup>3</sup>. What is the equivalent concentration in ppm at 25°C?
3. The visibility due to scattering only is found to be 3.0 km. What percentage of light will pass through a length of 0.3 km if the limit of visibility is defined as (a) a 98% reduction, and (b) a 99% reduction in the original light intensity?
4. Air at 25°C and 1 atm has 78% by volume N<sub>2</sub>, 21% by volume O<sub>2</sub>, and 0.05% by volume methyl ethyl ketone (MEK, CH<sub>3</sub>CH<sub>2</sub>COCH<sub>3</sub>).
  - a. What is the concentration of each component in ppm?
  - b. What is the concentration of each in μg/m<sup>3</sup>?
5. A PM<sub>10</sub> sampler was operated for a 24-hr period at a flowrate of 1.7 m<sup>3</sup>/min. At the end of the period, the filter had a weight gain of 0.53 grams after being desiccated. Determine the concentration of PM<sub>10</sub> in μg/m<sup>3</sup>.
6. Consider that cigarette smoke contains an average of 450 ppm carbon monoxide. If the average oxygen content in the air in the lungs is 19.0%, what percentage of the saturation level would the COHb concentration ultimately reach?