

# Quiz 1—Environmental Measurements

CENG 340—Introduction to Environmental Engineering

Instructor: Deborah Sills

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**Name:**

*(Modified from Mihelcic and Zimmerman)* Ice resurfacing machines (aka Zambonis) use internal combustion vehicles that give off exhaust containing carbon monoxide (CO) and nitrogen oxides ( $\text{NO}_x$ ). The outdoor air-quality, 1-h standard of CO is set at 30 ppm<sub>v</sub>. Average 1-h CO concentrations at Lynah Rink have been reported to be as high as 30 mg/m<sup>3</sup>. Assume that the temperature and pressure at Lynah equal 25 °C and 1 atm, respectively. In addition, note that (1) temperature in Kelvin (K) = temperature in Celsius (°C) + 273.15; (2) MW<sub>C</sub> = 12 g/mole and MW<sub>O</sub> = 16 g/mole; and (3) the ideal gas constant  $R = 8.205 \times 10^{-5} \frac{\text{m}^3 \times \text{atm}}{\text{mole} \times \text{Kelvin}}$ .

1. Does the concentration of CO at Lynah violate the outdoor air quality standard (show your work) [6 points]?
2. Calculate the partial pressure (in units of atm) of CO in the rink [2 points].
3. Report the concentration of CO at Lynah in units of moles/L [2 points].