ASSIGNMENT 2

CHEMISTRY 302

Due: 4:30 pm Wednesday 20 January 2010

1. (a) Obtain curves for the effect of the number of air changes per hour (ranging from 0.1 to 5.0 ach in 0.1 ach increments) on the steady-state concentration (in ppmv) of CO_2 in office building under these assumptions. Take the outdoor p(CO_2) as 347 ppmv.

   (i) Volume = 56,000 m^3; rate of CO_2 emissions = 4.9 kg h^{-1}

   (ii) Volume = 19,000 m^3; rate of CO_2 emissions = 3.4 kg h^{-1}

   (b) An office building of volume 14,000 m^3 has a natural infiltration rate of 0.49 ach and a ventilation system that causes a further 1.41 ach. When the ventilation system recirculates 86% of the building air, the steady state concentration is p(CO_2) is 822 ppmv. What portion of fresh air should be used if the p(CO_2) is not to exceed 550 ppmv. Take the outdoor p(CO_2) as 336 ppmv.

   (c) For the conditions of (b), how long would it take the air to drop from 822 to 600 ppmv?

2. A mobile home has a volume of 155 m^3 and a ventilation rate of 0.41 ach. If the indoor concentration of formaldehyde is 9.3 ppmv, what is the rate of emission of formaldehyde from materials in this home? State any assumptions that you make.