

Chemical Engineering 4310

Fall Semester, 2005

Homework Assignment #4

Chapters 5, 6 and 7

(For return in marked box in hall of 2nd floor
Chemical Sciences by noon on Friday, October 27)

Work problems 5-7, 5-21, 6-1, 6-3a, 6-7, 6-15, 6-30, 6-35, and 7-31 in the text

1. A lab worker has left an open beaker containing 1.5 liter of carbon disulfide on the desk in his lab office at the end of the work day, and he closed his office door when he left. To save energy, the company turns off the office ventilation system at the end of the work day. If the CS_2 evaporates it might form a flammable mixture in air, and an explosion might result if the worker turns the light switch on in the morning. The temperature is 30°C and the ambient pressure is 1 atm. The floor area of the room is 3 m by 3 m, and the ceiling height is 3 m.
 - a. Estimate the resulting concentration of CS_2 in the room, in volume %. Compare to the flammability limit.
 - b. Estimate the equivalent amount of TNT from the vapor. Make sure you clearly state any assumptions.
 - c. If the vapor explodes, at what distance is the 3 psi overpressure found?

Physical property data for CS_2 at 30°C :

Vapor pressure:	420 mm Hg
Liquid density:	1261 kg/m^3
Molecular weight:	76.13
Normal boiling point:	46.3°C