10.213 Fall 1999

Problem 6 (due Wednesday, September 22)

a) What is the heat required to raise the temperature of 12 moles of propane from 250 ºC to 1200 ºC at a constant pressure of 1 atm?

b) What is the final temperature when 800 kJ of heat is added to10 mol of ethylene initially at 200 ºC while the pressure remains constant?

c) If the heat capacity for a compound follows $C_P=A+BT+CT^2$, show that the difference between $<C_P>_H$ over the range from T_1 to T_2, differs from the value of C_P evaluated at the arithmetic mean temperature, $(T_1+T_2)/2$, is $C(T_2-T_1)^2/12$.

d) Evaluate the difference derived in part c for the specific conditions given in part a. What % error would this introduce into the calculation performed in part a?