Recitation **10.213** **02/25/02**

Spring 2002

Recap on Equations of States (EOS)

EOS relates P, V, and T. Given 2 variables → can get the other.

Method	Comments
Experimental Data	
Generalized Correlation	To use, need these values: _____, _____, and _____. Can use equations (3.60-3.62) when _____
Cubic EOS	When it gives 3 real positive roots, _____ is meaningless. Parameters (a, b) calculated using _____
Ideal Gas	

Cp and ΔH

1) True/False If the pressure is constant, $\Delta H = Cp\ \Delta T$

2) True/False For ideal gas, Cp is a constant.

3) True/False The enthalpy of an ideal gas at 300K increases as pressure is increased from 1 to 2 atm.

4) True/False ΔH_{rxn} can be calculated from $\Delta H_{formation}$ of the species because H is a state function.

Theoretical Flame Temperature

In a combustion process, $CH_{4(g)}$ is mixed with stoichiometric amount of $O_{2(g)}$. The reaction is:

$$CH_{4(g)} + 2\ O_{2(g)} \rightarrow CO_{2(g)} + 2\ H_2O_{(g)}$$

The heat of reaction at 25°C is –800,000 J per mole of CH_4.
Methane and oxygen mixture is fed to the burner at 25°C.

For our case, we will assume the following:
1) the combustion process is adiabatic,
2) the reaction reaches 100% conversion,
3) the heat capacities are constant: Cp for O_2 = 100 J/(mol K), Cp for CH_4, CO_2, and H_2O = 150 J/(mol K).

Calculate the flame temperature.