Example Exam I Fall 2020

ChE 3063 **EXAM I** **September 20, 2017**

Open Books and Notes

I. 10 points

Recalling that the lower heat of combustion of a hydrocarbon is the complete oxidation of that compound to give CO_2 (g) and H_2O (g), compute the lower heat of combustion of n-pentane at 298K. Use only the S&VN book for data. Show your work.

II. 20 points

Using the Pitzer generalized correlation for the second virial coefficient to model non-ideal gas effects, find ΔS when one mole of n-pentane changes from its ideal gas state at 1 bar and 400K to 20 bar and 600K.

III. 70 points

A liquid mixture of x_1=0.25 mole fraction of n-pentane/ x_2=0.75 mole fraction of n-hexane is at 400 kPa. Assume Raoult's Law is valid for the following calculations.

A. 40 points
What is the bubble point of the mixture?

B. 20 points
What is the composition of the (infinitesimally small bubble of) vapor in equilibrium with the liquid at its bubble point?

C. 10 points
What is the fugacity of n-hexane at the bubble point in both the liquid and gas phases?

Remember not to write on the back of your paper. Number your pages. Fold your work lengthwise and put your name on the outside just like homework is done.