**Chem 6854: Physical Chemistry**

**Homework Assignment #7**

Show work !

Due Friday 18 April

All problems except 7.9 and 7.11 are worth 3 points

37 points total

The problems assigned below provide exercise in computation of the various values of work that can occur during processes that mostly involve gases. They are `classics’ and represent foundation problems all students of chemistry should have firm grasp on.

7.1 Problem 19-1 of text page 800

7.2 Problem 19-2 of text page 800

7.3 Problem 19.3 of text page 800 (text answer has a typo…what is it ?)

7.4 Problem 19.4 of text page 801

7.5 Problem 19.7 of text page 801

The next three problems explore the specific situation of adiabatic expansion of ideal gases. The notion of a `heat’ free process is one of the novel ideas in thermodynamic analysis and the three problems below exercise students in deriving and manipulating variables consistent with this condition. Probably every student of chemical thermodynamics since 1900 have done similar problems.

7.6 Problem 19.15 of text page 802

7.7 Problem 19.17 of text page 802

7.8 Problem 19.18 of text page 802

Chemistry finally makes an appearance in the next two problems. The two selected illustrate how enthalpies and heat capacities are typically employed to determine the thermodynamic properties of compounds.

7.9 Problem 19.22 of text page 803 (FYI…my numbers are slightly different than McQuarrie’s) (4 pts)

7.10 Problem 19.23 of text page 803

Finally, students are exposed to the common practice of relating various partial derivatives in thermodynamics, collective referred to as `Maxwell’s relationships’ in the problem below. The practice is most particularly useful when things like `Joule-Thomson’ heating/cooling are studied- a process that underlies all refrigerators and heat pumps. (see for example: problems 19.52-19.54 of text, pp 807-808. These are `fun’ problems for some.)

7.11 Problem 19-27 page 803 (6 pts)