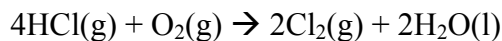# Practice Questions for Exam 1 (samples from prior years)

Read the questions thoroughly, set up the answers carefully, show your work, and be neat. Partial credit will be given when the instructor can follow your train of thought. If you have difficulty with a question, go on and return to it later. Check your work. GOOD LUCK!

1. Calculate $\Delta_r H$ for the following reaction (a) at 298 K and (b) at 348 K.

$$4HCl(g) + O_2(g) \rightarrow 2Cl_2(g) + 2H_2O(l)$$

Given:

Substance	$\Delta_f H^O$ (kJ/mol)	$C_{p,m}$ (J K-1 mol-1)
HCl(g)	-92.31	29.12
O₂(g)		29.355
Cl₂(g)		33.91
H₂O(l)	-285.83	75.291

2. A reversible expansion, in the thermodynamic sense, is characterized by several criteria (which turn out to be equivalent). List as many of them as you can.

3. Derive an expression for the work of an isothermal, reversible expansion of a real gas using the second-order virial equation. You should perform any needed integrations.