Quiz: Ch 19 & 20 **Name:**
Thermodynamics & Electrochemistry **Date:** **Pd: 6 7**
Version C (make-up)

Show your work for all questions; answer all parts of all questions. No work = no credit.

1. (2 pts) What's "free" about the Gibb's free energy?

2. (3 pts) Distinguish among the rotational, translational, and vibrational motion of a molecule. Use CO_2 as an example, if you'd like one.

3. Given the following table of standard thermodynamic data:

Compound	**ΔH^o_f kJ/mol**	**ΔS^o_f kJ/mol**	**ΔG^o_f J/(mol K)**
XeF_2 (g)	-108	-48	254
XeF_4 (g)	-251	-121	146

Consider the change: XeF_2 (s) + F_2 (g) → XeF_4 (g) at 298K and 1 atm.

a. (4 pts) What are the values of $\Delta S°$ and $\Delta H°$ for this conversion?

b. (3 pts) Perform a calculation to show whether it is thermodynamically feasible (practical) for this reaction to occur at 100ºC and 1 atm. Then explain how you know if it is feasible or not.

c. (3 pts) For the reaction, calculate the equilibrium constant K_{eq} at 100ºC.

4. A voltaic cell is constructed that consists of a 200.0 g zinc metal electrode in a solution of 0.10 M $Zn(NO_3)_2$, connected by a wire and a salt bridge to a 200.0 g copper metal electrode in a 2.50 M solution of $Cu(NO_3)_2$.

   Write the balanced half reaction that would occur at the:

   a. (2 pts) Cathode

   b. (2 pts) Anode

   c. (3 pts) Write the overall, balanced cell reaction and calculate E^{o}_{cell}.

   d. (4 pts) Calculate E_{cell} after this voltaic cell has produced a 10.0 A current for 10.0 hours. (Assume each half-cell contains 1.00 L of solution.)

   e. (4 pts) Calculate the mass of the zinc electrode after 10.0 hours.