Name: _____
(Please Print)

1. (6 points) **SHOW ALL WORK.** A gas is compressed from an initial volume of 4.50 L to a final volume of 1.20 L by an external pressure of 2.5 atm. During the compression, the gas releases 225 J of heat. Determine the change in the internal energy of the system in joules. (1 L·atm = 101.3 J).

2. (4 points) In the following statement, fill in the blanks with the relevant thermodynamic terms, e.g., ΔG, ΔH, ΔS, R, and/or combinations of them.

   If the equilibrium constant (K) for a reaction is measured at various temperatures (T), a plot of

   _____ on the y-axis vs _____ on the x-axis should be a straight

   line in which the slope = _____ and the y-intercept = _____.

3. (10 points) **SHOW ALL WORK.** Consider the following gas-phase reaction and the related thermodynamic data. Determine the equilibrium constant (K_p) for this reaction at a temperature of 450 K.

$$CO_{2(g)} + CCl_{4(g)} \rightleftharpoons 2\ COCl_{2(g)}$$
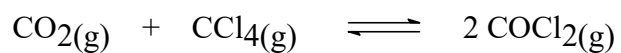
Compound	$\Delta H°_f$ (kJ/mole)	$S°$ (J/mole·K)
$CO_{2(g)}$	- 393.5	213.8
$CCl_{4(g)}$	- 95.7	309.7
$COCl_{2(g)}$	- 219.1	283.5