CHEM 36
General Chemistry
Quiz #4

Name: _**Key, Lime Pie**_

At 398.25 K, the following reaction has an equilibrium constant (K) equal to 2.4:

$$SO_2Cl_2 \ (g) \ \leftrightharpoons \ SO_2 \ (g) + Cl_2 \ (g)$$

1. If initially we have 1.0 atm of each compound in a reaction vessel: is the system at equilibrium and, if not, state whether the reaction proceeds to the right or to the left as equilibrium is approached. (Remember to show all work!)

Are we at equilibrium? Compare Q to K:

Q = $P_{SO2}P_{Cl2}/P_{SO2Cl2}$ = 1 < 2.4 (= K) Therefore, system is _NOT at equilibrium_

Since Q < K, we need _more products_ so rxn will proceed to the _RIGHT_.

2. If, after reaching equilibrium, the volume of the system is *increased*, will the reaction shift to the right or to the left as a result of this volume change? (Remember to show your work or reasoning behind your answer!)

In this system, 1 mol (reactants) gas ® 2 mol (products) gas

So, a *volume increase* will shift to the side of the reaction having the greatest number of moles of gas (products) – rxn will _shift to the RIGHT_.

3. If this reaction is *endothermic*, would the system shift to the right or to the left if the system at equilibrium was cooled? (Remember to show your work or reasoning behind your answer!)

For an endothermic process, we can view *heat as a reactant*; cooling the system *removes heat (a reactant)*, so the reaction will shift to make more reactant – reaction will _shift to the LEFT_.

4. If SO_2 (g) is added to the system at equilibrium, would the system shift to the right or to the left as it re-equilibrates? (Remember to show your work or reasoning behind your answer!)

SO_2 is a product, so reaction will shift so as to *decrease* the amount of added product by _shifting to the LEFT._