Quiz 3 | *take home due WEDNESDAY Feb. 20th* ***IN CLASS*** | Chem 132
Dr. Fantini | no books, notes, or help; complete in one sitting | February 18, 2013

Name: _____KEY_____ SB#: ____007_____

*** Use a calculator; letting calculator solve for "*x*" is OK, but check your results. ***

1. For the reaction shown below, the equilibrium constant in terms of ***pressures*** measured in atmospheres (atm) is $K_P = 0.754$ at 700 K. The initial pressures in a vessel at 700 K are $P_{(CCl_4)} = 0.95$ atm and $P_{(Cl_2)} = 0.55$ atm. What are the pressures of these species at equilibrium?

$$CCl_4(g) \rightleftharpoons C(s) + 2\,Cl_2(g)$$

	$CCl_4(g)$	$\rightleftharpoons$	$C(s)$	+	$2\,Cl_2(g)$
I	0.95				0.55
C	$-x$				$+2x$
E	$(0.95-x)$				$(0.55+2x)$

$$K_P = 0.754 = \frac{(P_{Cl_2})^2}{(P_{CCl_4})} = \frac{(0.55+2x)^2}{(0.95-x)}$$

$$0.754(0.95-x) = (0.55+2x)^2$$

$$0.7163 - 0.754x = 4x^2 + 2.2x + 0.3025$$

$$4x^2 + 2.954x - 0.4138 = 0$$

$x = -0.859$; $+0.120$

$P_{CCl_4} = 0.95 - 0.12$

$P_{Cl_2} = 0.55 + 2(0.12)$

$P_{CCl_4} = 0.83$ atm ; $P_{Cl_2} = 0.79$ atm

(over)

2. Which way does the reaction shown, initially at equilibrium, shift to reestablish equilibrium when the stated change in conditions is made. Choose "toward reactants" or "toward products" if there is a shift. If the change in conditions does not disturb the equilibrium, choose "no change." ***Circle your answer in each case.*** This reaction is known to be an ***exothermic*** reaction.

$$\underset{\textit{ammonia}}{2\,NH_3(g)} + CO_2(g) \rightleftharpoons \underset{\textit{urea}}{CO(NH_2)_2(s)} + H_2O(g)$$

change in conditions			
add a catalyst	*toward reactants*	*no change*	*toward products*
increase the pressure	*toward reactants*	*no change*	*toward products*
remove some of the urea	*toward reactants*	*no change*	*toward products*
remove some of the H_2O	*toward reactants*	*no change*	*toward products*
add some helium gas	*toward reactants*	*no change*	*toward products*
raise the temperature	*toward reactants*	*no change*	*toward products*
lower the temperature	*toward reactants*	*no change*	*toward products*
increase the volume	*toward reactants*	*no change*	*toward products*