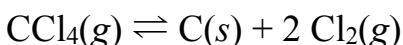


Name: \_\_\_\_\_ KEY \_\_\_\_\_ SB#: \_\_\_\_\_007\_\_\_\_\_

\*\*\* 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  $P_{\text{CCl}_4} = 0.95$  atm and  $P_{\text{Cl}_2} = 0.55$  atm. What are the pressures of these species at equilibrium?



	$\text{CCl}_4(\text{g})$	$\rightleftharpoons$	$\text{C}(\text{s})$	$+$	$2 \text{Cl}_2(\text{g})$
I	0.95				0.55
C	-x				+2x
E	(0.95-x)				(0.55+2x)

$$K_P = 0.754 = \frac{(P_{\text{Cl}_2})^2}{(P_{\text{CCl}_4})} = \frac{(0.55+2x)^2}{(0.95-x)}$$

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

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

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

$$x = -0.859; +0.120$$

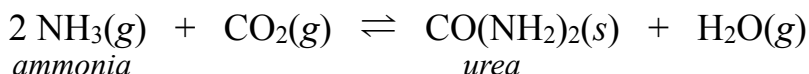
$$P_{\text{CCl}_4} = 0.95 - 0.12$$

$$P_{\text{Cl}_2} = 0.55 + 2(0.12)$$

$$P_{\text{CCl}_4} = 0.83 \text{ atm}; P_{\text{Cl}_2} = 0.79 \text{ atm}$$

(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.



**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 <sub>2</sub> O	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