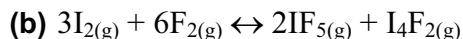
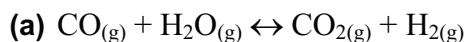


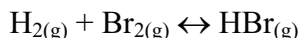
Assessment**Chapter 7****BLM 7-4****Chapter 7 Test****Goal**

Demonstrate and assess your understanding of the concepts presented in Chapter 7.

1. State the equilibrium expressions for the following reactions.

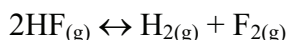


2. The equilibrium constant for the synthesis of $\text{HBr}_{(g)}$ from hydrogen and bromine gas is 2.18×10^6 at 730°C .



If 3.75 mol of HBr is put into a 15.0 L reaction vessel, calculate the concentration of H_2 , Br_2 , and HBr at equilibrium.

3. The K_c for the reaction



is 4.0. Predict the direction in which the equilibrium will shift if 3.0 mol of HF, 2.0 mol of H_2 and 4.0 mol of F_2 are put into a 5.0 L bulb.

4. At 250°C , the equilibrium constant for the reaction



is 0.041. The reaction is also endothermic, $\Delta H = 92.5 \text{ kJ}$.

- (a) Calculate the concentration of all the substances present at equilibrium if 0.20 mol of PCl_5 is placed in a 4 L reaction vessel.

- (b) Predict the shift in equilibrium expected when

- the temperature of the reaction mixture is increased
- PCl_3 is removed from the system
- Cl_2 is added to the system
- the pressure of the system is increased
- a catalyst is added

5. The equilibrium constant for the production of ammonia from nitrogen and hydrogen gas at 720°C is 2.37×10^{-3} .

(a) Assume if the concentrations in the reaction mixture are:

$$[\text{H}_2] = 0.68 \text{ mol/L}$$

$$[\text{N}_2] = 8.40 \text{ mol/L}$$

$$[\text{NH}_3] = 3.30 \text{ mol/L}$$

Determine the value of Q_c and state in which direction the equilibrium will shift.

(b) At 375°C, the K_c for the same reaction is increased to 1.2. Assume the initial concentrations in the reaction mixture are:

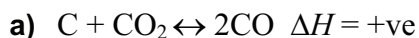
$$[\text{H}_2] = 0.75 \text{ mol/L}$$

$$[\text{N}_2] = 0.55 \text{ mol/L}$$

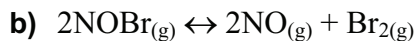
$$[\text{NH}_3] = 0.50 \text{ mol/L}$$

Predict the change in concentration that each gas will undergo in reaching equilibrium.

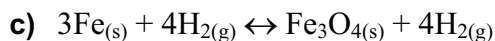
6. Predict the direction in which each of the following systems will shift upon applications of the stresses listed.



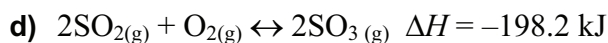
Stress: Increase in temperature



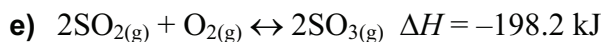
Stress: Decrease in pressure



Stress: Add Fe



Stress: Increase the pressure



Stress: Increase the temperature