

## Day 4.4 Warm-Up

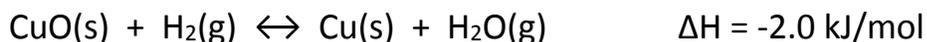
1.



After the equilibrium represented above is established, some pure  $\text{O}_2(\text{g})$  is injected into the reaction vessel at constant temperature. After equilibrium is reestablished, which of the following has a lower value compared to its value at the original equilibrium?

- $K_{\text{eq}}$  for the reaction.
- The total pressure in the reaction vessel.
- The amount of  $\text{SO}_3(\text{g})$  in the reaction vessel.
- The amount of  $\text{O}_2(\text{g})$  in the reaction vessel.
- The amount of  $\text{SO}_2(\text{g})$  in the reaction vessel.

2.



When the substances in the equation above are at equilibrium at pressure P and temperature T, the equilibrium can be shifted to favor the products by

- Increasing the pressure by means of a moving piston at constant T
- Increasing the pressure by adding an inert gas such as nitrogen
- Decreasing the temperature
- Allowing some gases to escape at constant P and T
- Adding a catalyst

3.



Some  $\text{PCl}_3$  and  $\text{Cl}_2$  are mixed in a container at  $200^\circ\text{C}$  and the system reaches equilibrium according to the equation above. Which of the following causes an increase in the number of moles of  $\text{PCl}_5$  present at equilibrium?

- Decreasing the volume of the container.
- Raising the temperature.
- Adding a mole of He gas at constant volume.

- I only
- II only
- I and III only
- II and III only
- I, II, and III

4.



For the reaction above,  $K_c$  at a certain temperature is 0.50. Calculate  $Q$  and then predict the direction in which the system will shift to reach equilibrium in each of the following cases:

a.  $[\text{NO}_2] = [\text{NO}] = [\text{O}_2] = 0.10 \text{ M}$

b. 1.23 mol NO and 0.168 mol  $\text{O}_2$  in a 10. L container

c.  $[\text{NO}_2] = 2 \text{ M}$ ,  $[\text{NO}] = 3 \text{ M}$ , and  $[\text{O}_2] = 1 \text{ M}$

d. Complete an ICE chart for the conditions given in question c.