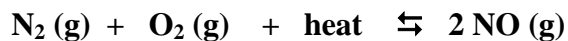


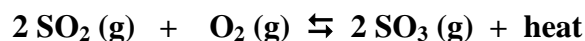
Equilibrium Worksheet #6: LeChatelier's Principle

1. Consider the following chemical reaction.



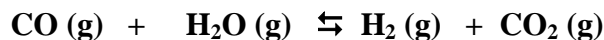
- (a) Will the equilibrium shift to the right or left when the temperature is increased?
- (b) What happens to the K value when the temperature is increased?

2. Consider the following chemical reaction.



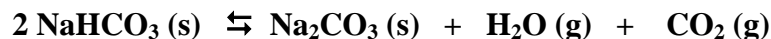
- (a) Will the equilibrium shift to the right or left when the temperature is increased?
- (b) What happens to the K value when the temperature is increased?

3. How will this system at equilibrium shift in each of the following cases?



- (a) Gaseous carbon dioxide is removed.
- (b) Water vapor is added.
- (c) The pressure is increased by adding helium gas.

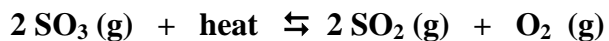
4. Heating solid sodium bicarbonate in a closed vessel establishes the following equilibrium:



What would happen to the equilibrium position if... (*assume the temperature remains constant*)

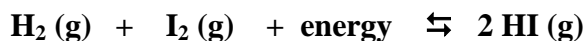
- (a) some of the CO_2 were removed from the system?
- (b) some solid Na_2CO_3 were added to the system?
- (c) some of the solid NaHCO_3 were removed from the system?

5. What will happen to the number of moles of SO₃ in equilibrium in the following reaction:



- (a) Oxygen gas is added.
- (b) The pressure is increased by decreasing the volume.
- (c) The pressure is increased by adding argon gas.
- (d) The temperature is decreased.
- (e) A catalyst is added.
- (f) Gaseous sulfur dioxide is removed.

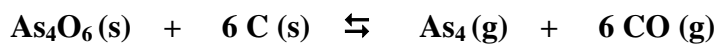
6. Consider the following chemical equation.



In which direction will the position of the equilibrium be shifted for each of these changes?

- (a) H₂ (g) is added.
- (b) I₂ (g) is removed.
- (c) HI (g) is removed.
- (d) Some Ar (g) is added.
- (e) The volume of the container is doubled.
- (f) The temperature is increased.

7. Predict the direction of the shift in the equilibrium position in response to each of these changes.



- (a) Addition of CO
- (b) Addition of C
- (c) Removal of some C
- (d) Addition of As₄O₆
- (e) Removal of gaseous arsenic (As₄)