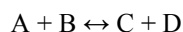


Practice Questions Section 1.2

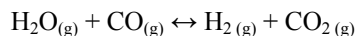
Reversible Reactions

1. Write reversible reactions for each of the following situations (be sure to balance your equations):
 - a. Hydrogen iodide gas (HI) decomposes into its elements.
 - b. Hydrogen and nitrogen gases combine to form ammonia gas, NH₃

2. Describe two different mixtures of starting materials that can be used to produce the equilibrium



3. If the system represented by the following equation is found to be at equilibrium at a specific temperature, which of the following statements is true? Explain your answers.



- a. All species must be present in the same concentration
 - b. The rate of the forward reaction equals the rate of the reverse reaction.
 - c. We can measure continual changes in the reactant concentrations.
4. Would you expect the combustion of methane, CH₄ with oxygen to form carbon dioxide and water, to be a reversible reaction?

Hint: Methane, or natural gas, is an important energy source. Considering this, what did you learn in the last unit that will help you predict whether or not the reverse reaction is likely to be spontaneous?

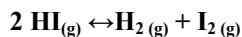
Practice Questions Section 1.2

Reversible Reactions

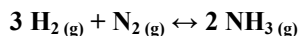
Answers

1. Write reversible reactions for each of the following situations (be sure to balance your equations):

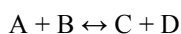
- a. Hydrogen iodide gas (HI) decomposes into its elements.



- b. Hydrogen and nitrogen gases combine to form ammonia gas, NH₃

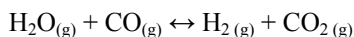


2. Describe two different mixtures of starting materials that can be used to produce the equilibrium

**Solution:**

You could start with either a mixture of A and B or with a mixture of C and D. Both starting materials will produce the same equilibrium.

3. If the system represented by the following equation is found to be at equilibrium at a specific temperature, which of the following statements is true? Explain your answers.



- a. All species must be present in the same concentration

False. At equilibrium, the concentrations will not change, but they are not necessarily the same for all reaction participants.

- b. The rate of the forward reaction equals the rate of the reverse reaction.

True. This is the definition of equilibrium.

- c. We can measure continual changes in the reactant concentrations.

False. Because the rate of the forward reaction equals the rate of the reverse reaction, the concentrations of the reactants decreases (as the forward reaction occurs) at the same rate that the concentration of the reactants increases (as the reverse reaction occurs). There is no net change in reactant concentrations.

4. Would you expect the combustion of methane, CH₄ with oxygen to form carbon dioxide and water, to be a reversible reaction?

Hint: Methane, or natural gas, is an important energy source. Considering this, what did you learn in the last unit that will help you predict whether or not the reverse reaction is likely to be spontaneous?

Solution:

No - this is a very exothermic reaction, releasing a lot of heat (methane, natural gas, is used as a heating fuel). The reverse reaction would be therefore be highly endothermic, requiring a lot of energy to make it go. Thus it is not likely to be reversible.