

Equilibrium and rates worksheet memo

1. List the factors which affect the rate of chemical reactions.
surface area of a solid reactant, concentration or pressure of a reactant, temperature, nature of the reactants, presence/absence of a catalyst.

2. Explain what the difference is between an open and closed system.
Closed system is not exposed to the environment and cannot react with anything in the surrounding environment, while an open system is open to the environment and can react with substances in the surrounding environment.

3. Which of the following reactions should occur in a closed system?

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4. State Le Chatelier's principle in words.

Le Chatelier's principle states that if a dynamic equilibrium is disturbed by changing the conditions, the position of equilibrium shifts to counteract the change to reestablish an equilibrium.

5. List the factors which will influence the position of an equilibrium in a closed system.

Change in pressure, temperature, or concentration of products or reactants

6. When ethane and oxygen are mixed in a closed container, the following equilibrium is established at a constant temperature of 183C. Select from Increases/ Remains constant/ Decreases.

Amount of CO₂ if the pressure is decreased by increasing the volume at constant temperature.

Increase. Favours the reaction that increases the pressure, which is the forward reaction as it produces more mole of gas in total.

7. Referring to the above information in question 6.

How will the amount of CO₂ change if the temperature of the system is increased at constant volume.

Decrease. Favours the endothermic reaction (reverse reaction in this case)

8. Referring to the above information in question 6.

How will the amount of CO₂ change if a catalyst is added to the system.

Remain the same. Catalyst only increases the rate of the reaction.

9. Referring to the above information in question 6.

How will the amount of CO₂ change if more oxygen is added to the container.

Increase. Favours the reaction that decreases O₂, which is the forward reaction

10. According to the reaction below. Is the forward reaction exothermic or endothermic?

Exothermic. ΔH is negative.

11. Calculate the value of ΔH per mole of ammonia formed. Use the equation above for the information.

Should be negative 46kJ

12. Use the equation above for the information.

State how the following changes affect the equilibrium concentration of ammonia.

The temperature of the system is increased.

Decrease. Favours the endothermic reaction (reverse reaction in this case)

13. Use the equation above for the information.

State how the following changes affect the equilibrium concentration of ammonia.

More H_2 (g) is added to the system.

Increase. Favours the reaction that decreases H_2 , which is the forward reaction

14. Use the equation above for the information.

State how the following changes affect the equilibrium concentration of ammonia.

The pressure of the system is decreased.

Decrease. Favours the reaction that increases the pressure, which is the reverse reaction as it has more mole of gas in total being formed.

15. Use the equation above for the information.

State how the following changes affect the equilibrium concentration of ammonia.

The volume of the system is decreased

Increase. Decreasing volume causes an increase in pressure. Therefore favours the forward reaction as it produces less mole of gas.