

Chemistry - Equilibrium and Thermodynamics

Question:

Is the reaction exothermic or endothermic? Match the words in the left column to the appropriate blanks in the sentences on the right.

Answer:

Given data:

- The effect of temperature (T) on the equilibrium constants (K_c) and (K_p) .

To solve:

Step 1: Determine the relationship between temperature and equilibrium constants for exothermic vs. endothermic reactions.

- For an **exothermic** reaction, as temperature increases, equilibrium constants (K_c) and (K_p) **decrease**.
- For an **endothermic** reaction, as temperature increases, equilibrium constants (K_c) and (K_p) **increase**.

Explanation: According to Le Chatelier's Principle, increasing temperature will shift the equilibrium position of an exothermic reaction to the left (reactants side), resulting in a decrease in the value of equilibrium constants. For an endothermic reaction, the equilibrium will shift to the right (products side), resulting in an increase in the value of equilibrium constants.

Step 2: Fill in the blanks using the determined relationships.

As (T) increases, (K_c) **decreases**, and (K_p) **decreases**, so the reaction is **exothermic**.

Explanation: As the temperature (T) increases, if both (K_c) and (K_p) decrease, it indicates that the reaction is exothermic.

Final Solution:

Sentence modification with appropriate words: As (T) increases, (K_c) **decreases**, and (K_p) **decreases**, so the reaction is **exothermic**.

Supporting Statement: The decrease in equilibrium constants as temperature increases confirms that the reaction releases heat, making it exothermic.