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Gibbs free energy, also known as thermodynamic potential or free enthalpy, measures how much work a thermodynamic system can do at constant pressure and temperature. It's crucial to understand the concept of Gibbs Free Energy Formula to figure out how changes in entropy and enthalpy values occur. The Gibbs energy (G) function was developed by Willard Gibbs to calculate these changes. Gibbs free energy is used to determine if a reaction is preferred or disfavored, as well as whether it's spontaneous or not. It's also used to establish the equilibrium constant of a system. Gibbs' free energy formula is $\Delta G = \Delta H - T\Delta S$, where ΔG represents the Gibbs Free Energy, ΔH is the Enthalpy Change, T is the Temperature in Kelvin, and ΔS is the Entropy change. The SI units of Gibb's free energy are Joules or Kilojoules. Gibbs free energy changes can be expressed as $\Delta G = \Delta U + P\Delta V - T\Delta S$. If a reaction occurs at constant temperature and pressure, $\Delta G = \Delta H - T\Delta S$. In spontaneous processes like ice melting, ammonia synthesis from nitrogen, and hydrogen gas production, the Gibbs free energy is negative. The Gibbs-Helmholtz equation states that $\Delta G = \Delta H - T\Delta S$, and for a reaction to be spontaneous, ΔG must be negative ($\Delta G < 0$). This can occur when $T\Delta S$ is positive and ΔH is negative, or when both $T\Delta S$ and ΔH have negative values. The process does not take place if ΔG is 0, indicating that the system is in equilibrium. Key points about Gibbs free energy: * It measures how much work a thermodynamic system can do at constant pressure and temperature. * The Gibbs energy (G) function was developed by Willard Gibbs to calculate changes in entropy and enthalpy values. * Gibbs free energy is used to determine if a reaction is preferred or disfavored, as well as whether it's spontaneous or not. * The SI units of Gibb's free energy are Joules or Kilojoules. * In spontaneous processes, the Gibbs free energy is negative. The text consists of six questions related to thermodynamics, specifically free energy changes. Question 1: Calculate the free energy change for ice melting at 25°C. The answer is that the free energy change is positive, indicating that the process is not spontaneous. Question 2: Calculate the standard free energy change for the reaction $Zn(s) + Cu2+(aq) \rightarrow Zn2+(aq) + Cu(s)$. The answer is that the free energy change is -193.29 J/mol. Question 3: Calculate the Gibbs free energy for a system at a certain temperature and entropy, given an enthalpy change. The answer is that the Gibbs free energy is calculated using the formula $\Delta G = \Delta H - T\Delta S$. Question 4: Explain how to calculate the enthalpy change when the Gibbs free energy, temperature, and entropy are given. Question 5: Calculate the Gibbs free energy for a system at a certain temperature and entropy, given an enthalpy change. The answer is that the Gibbs free energy is calculated using the formula $\Delta G = \Delta H - T\Delta S$. Question 6: Explain how to calculate the enthalpy change when the Gibbs free energy, temperature, and entropy are given, and describe the concept of a constant volume reservoir in thermodynamics. Note that I condensed some of the information from the original text to make it easier to understand.

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