

Name :

Honors Chemistry

Section :

Enthalpy, Entropy, and Free Energy

Free elements have zero enthalpy and zero free energy. Table A-10 in the appendix of your textbook has the thermodynamic values.

$$\Delta H_{(rxn)}^{\circ} = \Sigma \Delta H_f^{\circ}(\text{products}) - \Sigma \Delta H_f^{\circ}(\text{reactants})$$

$$\Delta G_{(rxn)}^{\circ} = \Sigma \Delta G_f^{\circ}(\text{products}) - \Sigma \Delta G_f^{\circ}(\text{reactants})$$

$$\Delta S_{(rxn)}^{\circ} = \Sigma S^{\circ}(\text{products}) - \Sigma S^{\circ}(\text{reactants})$$

1. What is the enthalpy change for the following reaction? $\text{Cl}_2(\text{g}) + 2 \text{HBr}(\text{g}) \rightarrow 2 \text{HCl}(\text{g}) + \text{Br}_2(\text{g})$
2. For the reaction $\text{Ca}(\text{cr}) + 2 \text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca}(\text{OH}_2)(\text{cr}) + \text{H}_2(\text{g})$, $\Delta S_{rxn}^{\circ} = 25.7 \text{ J/K}$. What is S° for $\text{Ca}(\text{OH}_2)(\text{cr})$?
3. Calculate $\Delta G_{(rxn)}^{\circ}$ for the reaction: $2 \text{H}_2\text{O}_2(\text{l}) \rightarrow 2 \text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$
4. Find $\Delta H_{(rxn)}^{\circ}$ for the reaction: $2 \text{KBr}(\text{cr}) + \text{H}_2\text{SO}_4(\text{l}) \rightarrow \text{K}_2\text{SO}_4(\text{cr}) + 2 \text{HBr}(\text{g})$
5. Find $\Delta S_{(rxn)}^{\circ}$ for the reaction: $2 \text{NO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HNO}_2(\text{aq}) + \text{HNO}_3(\text{aq})$

Answers

1. -111.8 kJ
2. 75.9 J/mol K
3. -234 kJ
4. $+ 1.20 \times 10^2 \text{ kJ}$
5. -451 J/K