

Answers to Homework: Unit 5, Lesson 02: Predicting the Direction of a Reversible Reaction

- 2a) The forward reaction is exothermic. Minimum enthalpy favours the products.
- 2b) For the forward reaction, entropy decreases. There are three molecules of gas on reactant side, but only 2 molecules of gas on product side.
- 2c) ΔS is negative so entropy decreases. Maximum entropy favours the reactants.
- 2d) $\Delta G = +22.12 \text{ kJ}$ at 900.0°C (1173 K)
- 2e) The reaction is NOT spontaneous at 900.0°C (at this temp, the reverse reaction is favoured).
- 2f) The forward and reverse reactions are equally favoured when $\Delta G = 0 \text{ kJ}$. This occurs at a temperature of +1055K or 782°C .
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- 3a) The forward reaction is endothermic. Minimum enthalpy favours the reactants.
- 3b) For the forward reaction, entropy increases. There are two solid particles on the reactant side, but two solid and one gas particle on the product side.
- 3c) ΔS is positive so entropy increases. Maximum entropy favours the products.
- 3d) At 0.0°C , $\Delta G = +13.1 \text{ kJ}$. The reaction is NOT spontaneous at 0.0°C (at this temp, the reverse reaction is favoured).
- 3e) At 100.0°C , $\Delta G = -3.45 \text{ kJ}$, the reaction is spontaneous at 100.0°C (at this temp, the forward reaction is favoured).
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- 4a) The forward reaction is exothermic. Minimum enthalpy favours the products.
- 4b) For the forward reaction, entropy decreases. There are four molecules of gas on reactant side, but only 2 molecules of gas on product side.
- 4c) ΔS is negative so entropy decreases. Maximum entropy favours the reactants.
- 4d) $\Delta G = -33.1 \text{ kJ}$ at 25°C (298 K).
- 4e) The reaction is spontaneous at 25.0°C (at this temp, the forward reaction is favoured).
- 4f) The forward and reverse reactions are equally favoured when $\Delta G = 0 \text{ kJ}$. This occurs at a temperature of 466K or 193°C .