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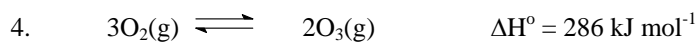
1. Explain the term **enthalpy**. What is an **exothermic** reaction?
2. Calculate the heat of combustion $\Delta H^\circ_c(\text{C}_2\text{H}_4(\text{g}), 298\text{K})$ when ethene (C_2H_4) is combusted to form $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$.
3. The oxidation of carbon (graphite) to carbon monoxide occurs spontaneously at 375K. After reaction of the above system in a closed reaction vessel the equilibrium partial pressure of oxygen is 0.021 atm and that of carbon monoxide is 0.50 atm. Write down the expression for K_p and determine the value of K_p in the above system.

Additional information:

$$\Delta H^\circ_f(\text{C}_2\text{H}_4(\text{g}), 298\text{K}) = 53 \text{ kJ/mol}$$

$$\Delta H^\circ_f(\text{CO}_2(\text{g}), 298\text{K}) = -394 \text{ kJ/mol}$$

$$\Delta H^\circ_f(\text{H}_2\text{O}(\text{l}), 298\text{K}) = -286 \text{ kJ/mol}$$



In an equilibrium reaction mixture of the above reaction how would $p(\text{O}_2)$ and K_p change if the temperature of the reaction vessel were raised? Explain your answer.

5. 50.0 mL of water at 75.0°C is added to a thermos flask containing 100.0 mL of water. The water in the thermos flask prior to the addition is at 25.0°C. Assuming that no heat is lost to the surroundings what is the final temperature of the water in the flask?
($C_s \text{ H}_2\text{O} 4.184 \text{ J K}^{-1} \text{ g}^{-1}$, $\rho \text{ H}_2\text{O} 1.00 \text{ g cm}^{-3}$)