Entropy, Free Energy, and Equilibrium

HW-chapter 18

№	Questions
1	Which of the following reactions has the largest positive molar entropy change? a) $H_2O(s) \rightarrow H_2O(g)$ b) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$ c) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ d) $KClO_4(s) + 4C(s) \rightarrow KCl(s) + 4CO(g)$
2	Which of the following will have the **greatest** standard molar entropy ($S°$)? a) $NH_3(g)$ b) $H_2O(l)$ c) $He(g)$ d) $CaCO_3(s)$
3	Hydrogen reacts with nitrogen to form ammonia (NH_3) according to the reaction $3H_2(g) + N_2(g) \leftrightarrow 2NH_3(g)$ The value of $\Delta H°$ is –92.38 kJ/mol, and that of $\Delta S°$ is –198.2 J/mol · K. Determine $\Delta G°$ at 25°C. a) +5.897 × 104 kJ/mol b) –16.66 kJ/mol c) –33.32 kJ/mo d) +297.8 kJ/mol
4	Determine $\Delta S°$ for the reaction **$SO_3(g) + H_2O(l) \leftrightarrow H_2SO_4(l)$.** Given these absolute entropies: S° (J/K·mol) SO_3 , 256.2 ;H_2O, 69.9;H_2SO_4 ,156.9 a) 169.2 J/K·mol b) 1343.2 J/K·mol c) –169.2 J/K·mol d) –29.4 J/K·mol
5	Hydrogen peroxide (H_2O_2) decomposes according to the equation **$H_2O_2(l) \leftrightarrow H_2O(l) + ½O_2(g)$** Calculate Kp for this reaction at 25°C. ($\Delta H° = –98.2$ kJ/mol, $\Delta S° = 70.1$ J/K·mol) a) 1.3×10^{-21} b) 20.9 c) 3.46×10^{17} d) 7.5×10^{20}