1) Predict the sign of ΔS^0 for each of the following reactions.
   a. $CCl_{4(l)} + 5\ O_{2(g)} \rightarrow CO_{2(g)} + 4\ ClO_{2(g)}$
   b. $8\ H_2O_{(l)} + S_{8(s)} \rightarrow 8\ H_2S_{(g)} + 4\ O_{2(g}$
   c. $Br_{2(l)} \rightarrow Br_{2(s)}$
   d. $2\ NH_{3(g)} \rightarrow N_{2(g)} + 3\ H_{2(g)}$

2) Use Table 17.1 to calculate ΔS^0 for each of the following reactions.
   a. $4\ NH_{3(g)} + 7\ O_{2(g)} \rightarrow 4\ NO_{2(g)} + 6\ H_2O_{(g)}$
   b. $2\ H_2O_{2(l)} + N_2H_{4(l)} \rightarrow N_{2(g)} + 4\ H_2O_{(g)}$
   c. $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$
   d. $CH_{4(g)} + 3\ Cl_{2(g)} \rightarrow CHCl_{3(l)} + 3\ HCl_{(g)}$
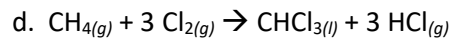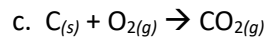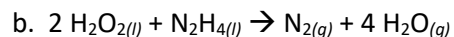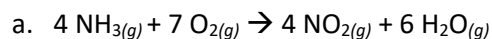
3) Calculate ΔG^0 at 45°C for reactions for which
   a. $\Delta H^0 = 293$ kJ; $\Delta S^0 = -695$ J/K
   b. $\Delta H^0 = -1137$ kJ; $\Delta S^0 = 0.496$ kJ/K
   c. $\Delta H^0 = -86.6$ kJ; $\Delta S^0 = -392$ J/K

4) It has been proposed that wood alcohol, CH_3OH, a relatively inexpensive fuel to produce, be decomposed to produce methane. Methane is a natural gas commonly used for heating homes. Is the decomposition of wood alcohol to methane and oxygen thermodynamically feasible at 25°C and 1 atm?

5) The reaction between magnesium metal and liquid water produces solid $Mg(OH)_2$ and hydrogen gas. Calculate ΔG^0 for the formation of one mole of $Mg(OH)_2$ at 25°C and at 15°C.