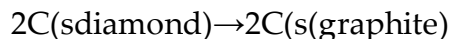


Exercise 01 :

Given the reaction of diamond converting to graphite



Determine ΔG at 298 K and determine if this reaction is spontaneous or not.

What does ΔG say about the rate of this reaction?

- $\Delta H^\circ_f(\text{C(s,diamond)}) = 1.9 \text{ kJ/mol}$
- $S^\circ(\text{C(s,diamond)}) = 2.38 \text{ J/(molK)}$
- $S^\circ(\text{C(s,graphite)}) = 5.74 \text{ J/(molK)}$

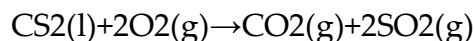
Exercise 02 :

Given these reactions reactions, determine whether the ΔS increases or decreases or stays the same at 25 °C;

- $\text{H}_2\text{SO}_4(\text{l}, 1\text{atm}) \rightarrow \text{H}_2\text{SO}_4(\text{s}, 1\text{atm})$
- $\text{H}_2\text{O}(\text{l}, 1\text{atm}) \rightarrow \text{H}_2\text{O}(\text{g}, 1\text{atm})$
- $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$

Exercise 03 :

Calculate ΔG° for



using **only** the following ΔG values for the reaction:

- $\text{C(s)} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$ with $\Delta G^\circ = -394.39 \text{ kJ/mol}$
- $\text{S(s)} + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$ with $\Delta G^\circ = -300.13 \text{ kJ/mol}$
- $\text{C(s)} + 2\text{S(s)} \rightarrow \text{CS}_2(\text{l})$ with $\Delta G^\circ = 67.1 \text{ kJ/mol}$

Exercise 04 :

The density of an aqueous solution of methyl alcohol, containing 60% alcohol by mass, is equal to 0.8946 g/cm³, while the partial molar volume of the water it contains is equal to 16.8 cm³ /mole.

Calculate the partial molar volume of the alcohol in this solution.

Use the flowing equation : $V = n_1 V_1 + n_2 V_2$