

Entropy and Gibbs free energy – 2021

1. Nov/2021/Paper_42/No.3e

(e) The standard entropies, S° , of three species are given in the table.

species	$S^\circ/\text{JK}^{-1}\text{mol}^{-1}$
HCl(g)	+187
H ₂ (g)	+131
Cl ₂ (g)	+223

(i) Calculate ΔS° for the reaction $2\text{HCl}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \text{Cl}_2(\text{g})$.

$$\Delta S^\circ = \dots\dots\dots \text{JK}^{-1}\text{mol}^{-1} \quad [1]$$

(ii) ΔH° for the reaction $2\text{HCl}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \text{Cl}_2(\text{g})$ is $+185\text{kJmol}^{-1}$.

Calculate ΔG° for this reaction at 298 K.

$$\Delta G^\circ = \dots\dots\dots \text{kJmol}^{-1} \quad [2]$$

(iii) Predict the effect of increasing temperature on the spontaneity of this reaction. Explain your answer.

.....
..... [1]

