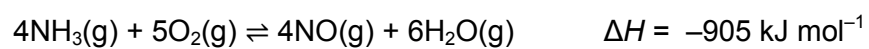


**0 3**

The equation for the reaction between ammonia and oxygen is shown.



Some standard entropies are given in **Table 3**.

**Table 3**

Gas	$S^\ominus / \text{J K}^{-1} \text{mol}^{-1}$
$\text{NH}_3(\text{g})$	193
$\text{O}_2(\text{g})$	205
$\text{NO}(\text{g})$	211
$\text{H}_2\text{O}(\text{g})$	189

**0 3 . 1**

Calculate the entropy change for the reaction between ammonia and oxygen.

**[2 marks]**

Entropy change \_\_\_\_\_  $\text{J K}^{-1} \text{mol}^{-1}$



**0 3 . 2**

Calculate a value for the Gibbs free-energy change ( $\Delta G$ ), in  $\text{kJ mol}^{-1}$ , for the reaction between ammonia and oxygen at  $600\text{ }^\circ\text{C}$

(If you were unable to obtain an answer to Question **03.1**, you should assume that the entropy change is  $211\text{ J K}^{-1}\text{ mol}^{-1}$ . This is **not** the correct answer.)

**[2 marks]** $\Delta G$  \_\_\_\_\_  $\text{kJ mol}^{-1}$ **0 3 . 3**

The reaction between ammonia and oxygen was carried out at a higher temperature.

Explain how this change affects the value of  $\Delta G$  for the reaction.

**[2 marks]**

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**Question 3 continues on the next page**

**Turn over ►**

