

- Consider the reaction of $\text{H}_2(\text{g})$ with $\text{I}_2(\text{g})$ at 298 K to give $\text{HI}(\text{g})$.



If partial pressures of 0.20 atm of all three gases are mixed, in which direction will the reaction proceed?

Marks
3

Answer:

Calculate ΔG° for this reaction at 298 K.

Answer:

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY

- Calculate ΔG° for the following reaction at 25 °C.



Data:

	$S^\circ / \text{J K}^{-1} \text{ mol}^{-1}$	$\Delta_f H^\circ / \text{kJ mol}^{-1}$
$\text{SO}_3(\text{g})$	256.2	-395.2
$\text{NH}_3(\text{g})$	192.5	-46.19
$\text{NO}(\text{g})$	210.6	90.37
$\text{SO}_2(\text{g})$	248.5	-296.9
$\text{H}_2\text{O}(\text{g})$	188.7	-241.8

Marks**4**

Answer:

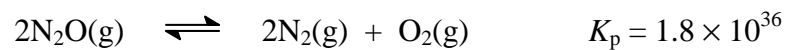
Is the reaction spontaneous? Give a reason for your answer.

At what temperature does the spontaneity change?

Answer:

4

- Nitrous oxide decomposes at 25 °C according to the following equation.



What is the value for K_p at 40 °C?

Answer:

Is the reaction endothermic or exothermic? Give a reason for your answer.

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- The reaction $2A + B \rightarrow C + 3D$ has reached equilibrium.
What is the expression for the equilibrium constant, K_c ?

2

Explain how the equilibrium constant, K_c , changes when more C is added to the reaction mixture.

Marks
5

- The autoionisation of water conforms to the following balanced equation:



Is this an exothermic or endothermic reaction?

What will happen to the equilibrium if the temperature is raised?

The equilibrium constant, K , for this reaction is 1.8×10^{-16} at 25°C . Calculate ΔG .

Answer:

Why is ΔG not equal to ΔH for this reaction?

The pH of pure water is 6.81 at 37°C . Is water acidic, basic or neutral at this temperature? Explain.