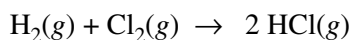


2010 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS (Form B)

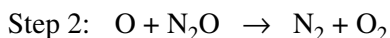
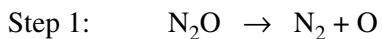


6. The table below gives data for a reaction rate study of the reaction represented above.

Experiment	Initial [H ₂] (mol L ⁻¹)	Initial [Cl ₂] (mol L ⁻¹)	Initial Rate of Formation of HCl (mol L ⁻¹ s ⁻¹)
1	0.00100	0.000500	1.82×10^{-12}
2	0.00200	0.000500	3.64×10^{-12}
3	0.00200	0.000250	1.82×10^{-12}

- Determine the order of the reaction with respect to H₂ and justify your answer.
- Determine the order of the reaction with respect to Cl₂ and justify your answer.
- Write the overall rate law for the reaction.
- Write the units of the rate constant.
- Predict the initial rate of the reaction if the initial concentration of H₂ is 0.00300 mol L⁻¹ and the initial concentration of Cl₂ is 0.000500 mol L⁻¹.

The gas-phase decomposition of nitrous oxide has the following two-step mechanism.



- Write the balanced equation for the overall reaction.
- Is the oxygen atom, O, a catalyst for the reaction or is it an intermediate? Explain.
- Identify the slower step in the mechanism if the rate law for the reaction was determined to be $rate = k [\text{N}_2\text{O}]$. Justify your answer.

STOP

END OF EXAM