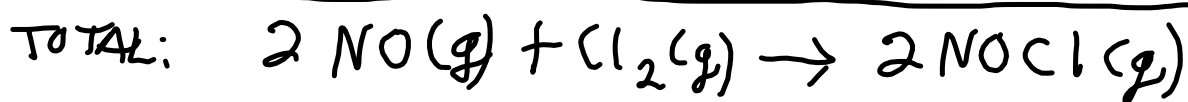
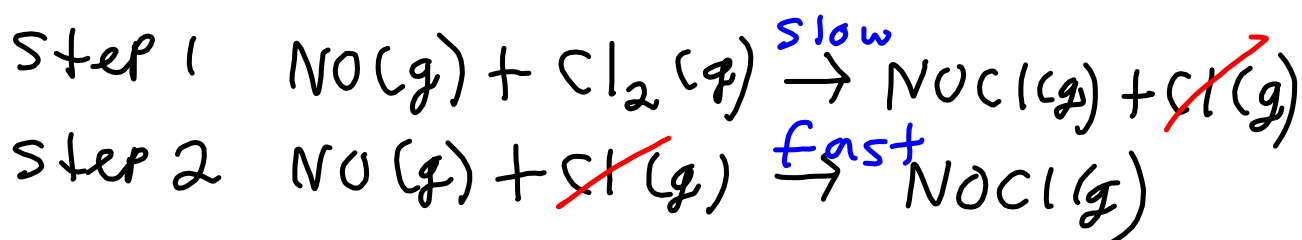


Experimentally Determined
Rate Law: $R = k [\text{NO}]^2 [\text{Cl}_2]$

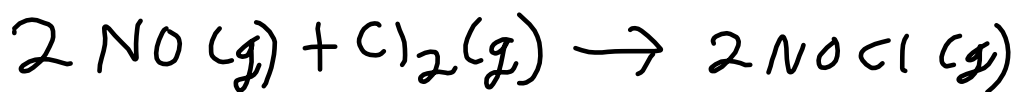
Proposed Mechanism:



Predicted Rate Law:

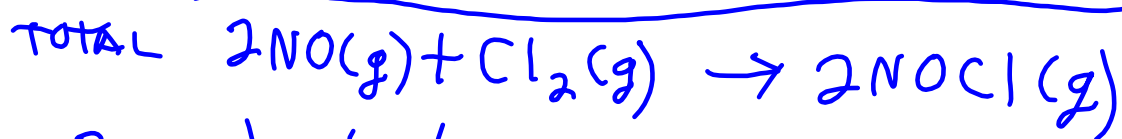
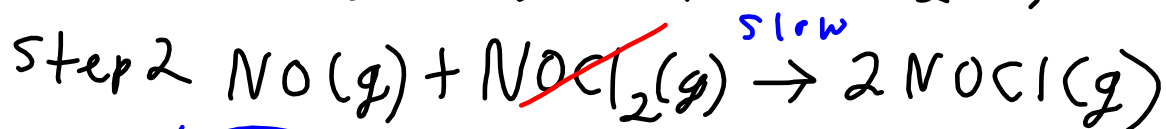
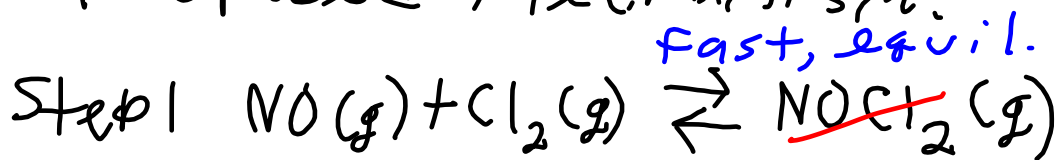
$$R = k [\text{NO}] [\text{Cl}_2]$$

The predicted rate law does not agree with the experimentally determined rate law, so we must reject this mechanism



$$R = k [\text{NO}]^2 [\text{Cl}_2]$$

Proposed Mechanism:



Predicted Rate Law:

$$R = k [\text{NO}] [\text{NOCl}_2]$$

$$R_{1f} = k_{1f} [\text{NO}] [\text{Cl}_2]$$

$$R_{1r} = k_{1r} [\text{NOCl}_2]$$

$$R_{1r} = R_{1f}$$

$$k_{1r} [\text{NOCl}_2] = k_{1f} [\text{NO}] [\text{Cl}_2]$$

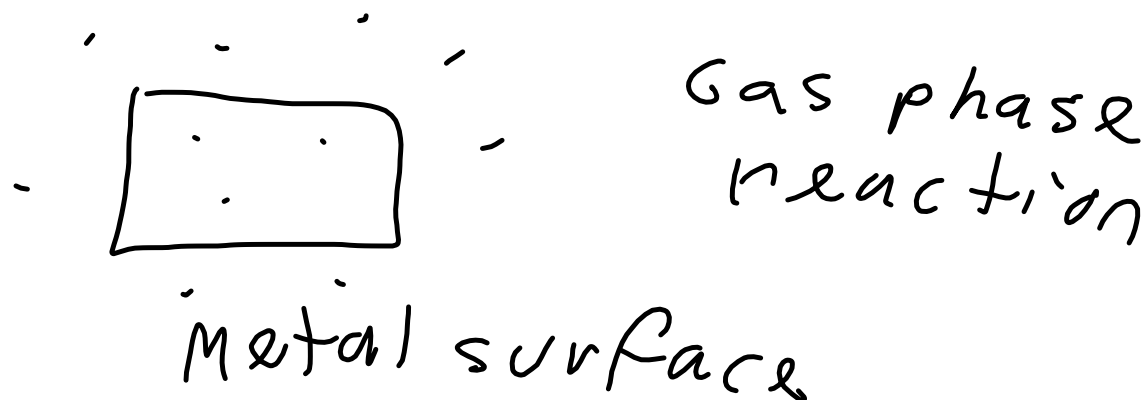
$$[\text{NOCl}_2] = \left(\frac{k_{1f}}{k_{1r}} \right) [\text{NO}] [\text{Cl}_2]$$

$$R_{2f} = k_{2f} [\text{NO}] \left(\frac{k_{1f}}{k_{1r}} \right) [\text{NO}] [\text{Cl}_2]$$

$$= k [\text{NO}]^2 [\text{Cl}_2]$$

CATALYSIS

Heterogeneous Catalyst



Homogeneous Catalyst

