**Marks 7**

- Nitrogen monoxide, a noxious pollutant, reacts with oxygen to produce nitrogen dioxide, another toxic gas:

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$$

The following rate data were collected at 225 $^oC$.

| Experiment | $[NO]_0$ (M) | $[O_2]_0$ (M) | Initial rate, $-d[O_2]/dt$, (M $s^{-1}$) |
|---|---|---|---|
| 1 | $1.3 \times 10^{-2}$ | $1.1 \times 10^{-2}$ | $1.6 \times 10^{-3}$ |
| 2 | $1.3 \times 10^{-2}$ | $2.2 \times 10^{-2}$ | $3.2 \times 10^{-3}$ |
| 3 | $2.6 \times 10^{-2}$ | $1.1 \times 10^{-2}$ | $6.4 \times 10^{-3}$ |

Determine the rate law for the reaction.

Calculate the value of the rate constant at 225 $^oC$.

Answer:

Calculate the rate of appearance of $NO_2$ when $[NO] = [O_2] = 6.5 \times 10^{-3}$ M.

Answer:

Suggest a possible mechanism for the reaction based on the form of the rate law. Explain your answer.