Rate law example with one reactant

Determine the rate law and calculate the rate constant k using the following experimental data.

Experiment number	Initial A concentration (M)	Observed initial rate (M/s)
1	0.0100	5.4×10^{-7}
2	0.0200	2.16×10^{-6}
3	0.0400	8.64×10^{-6}

Practice 0.5

Determine the rate law and calculate the rate constant k using the following experimental data.

Experiment number	Initial B concentration (M)	Observed initial rate (M/s)
1	0.0050	9.3×10^{-3}
2	0.0100	3.7×10^{-2}
3	0.0025	2.3×10^{-3}

Practice 1.5

Determine the rate law for the following reaction:

$BrO_3^-(aq) + 5Br^-(aq) + 6H^+(aq) \rightarrow 3Br_2(aq) + 3H_2O(l)$

	Initial concentrations			Rate in
Mixture	**$[BrO_3^-]$ in M**	**$[Br^-]$ in M**	**$[H^+]$ in M**	**M per unit time**
A	0.0050	0.025	0.030	10
B	0.010	0.025	0.030	20
C	0.010	0.050	0.030	40
D	0.010	0.050	0.060	160

Challenge problem

Using the initial rates method and the experimental data, determine the rate law and the value of the rate constant for this reaction:

$$2NO(g) + Cl_2(g) \longrightarrow 2NOCl(g)$$

Trial	[NO] (mol/L)	$[Cl_2]$ (mol/L)	$-\frac{\Delta[NO]}{\Delta t}$ $(\text{mol L}^{-1}\text{ s}^{-1})$
1	0.10	0.10	0.00300
2	0.10	0.15	0.00450
3	0.15	0.10	0.00675