

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}

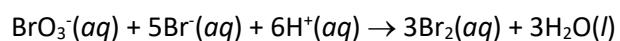
Practice 0.5

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

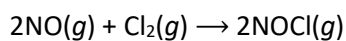
Determine the rate law for the following reaction:



Mixture	Initial concentrations			Rate in M per unit time
	$[\text{BrO}_3^-]$ in M	$[\text{Br}^-]$ in M	$[\text{H}^+]$ in M	
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:



Trial	$[\text{NO}]$ (mol/L)	$[\text{Cl}_2]$ (mol/L)	$-\frac{\Delta[\text{NO}]}{\Delta t}$ ($\text{mol L}^{-1} \text{s}^{-1}$)
1	0.10	0.10	0.00300
2	0.10	0.15	0.00450
3	0.15	0.10	0.00675