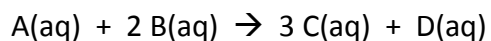


Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

## Differential Rate Law Practice

Example:

**1981**



For the reaction above, carried out in solution of 30°C, the following kinetic data were obtained:

Experiment	[A] <sub>0</sub> (mol/L)	[B] <sub>0</sub> (mol/L)	Initial Rate of Reaction (mol/L · hr)
1	0.240	0.480	8.00
2	0.240	0.120	2.00
3	0.360	0.240	9.00
4	0.120	0.120	0.500
5	0.240	0.0600	1.00
6	0.0140	1.35	?

- Write the rate-law expression for this reaction.
- Calculate the value of the specific rate constant  $k$  at 30°C and specify its units.
- Calculate the value of the initial rate of this reaction at 30°C for the initial concentrations shown in experiment 6.

Practice:

For each reaction, determine the following:

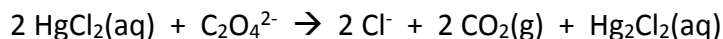
- Order of each reactant
- Rate law expression
- Overall order of reaction
- Value of rate constant,  $k$ , with proper units

1984



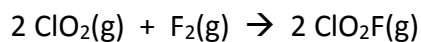
Initial Rate of Formation of Z (mol L <sup>-1</sup> sec <sup>-1</sup> )	Initial [X] <sub>0</sub> (mol L <sup>-1</sup> )	Initial [Y] <sub>0</sub> (mol L <sup>-1</sup> )
7.0 × 10 <sup>-4</sup>	0.20	0.10
1.4 × 10 <sup>-3</sup>	0.40	0.20
2.8 × 10 <sup>-3</sup>	0.40	0.40
4.2 × 10 <sup>-3</sup>	0.60	0.60

1987



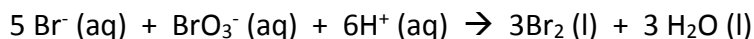
Experiment	Initial [HgCl <sub>2</sub> ]	Initial [C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> ]	Initial Rate of Formation of Cl <sup>-</sup> (mol L <sup>-1</sup> min <sup>-1</sup> )
1	0.0836	0.202	0.52 × 10 <sup>-4</sup>
2	0.0836	0.404	2.08 × 10 <sup>-4</sup>
3	0.0418	0.404	1.06 × 10 <sup>-4</sup>
4	0.0316	?	1.27 × 10 <sup>-4</sup>

1991



Experiment	Initial [ClO <sub>2</sub> ] (mol L <sup>-1</sup> )	Initial [F <sub>2</sub> ] (mol L <sup>-1</sup> )	Initial Rate of Increase of [ClO <sub>2</sub> F] (mol L <sup>-1</sup> sec <sup>-1</sup> )
1	0.010	0.10	2.4 × 10 <sup>-3</sup>
2	0.010	0.40	9.6 × 10 <sup>-3</sup>
3	0.020	0.20	9.6 × 10 <sup>-3</sup>

2003



Experiment	Initial [Br <sup>-</sup> ] (mol L <sup>-1</sup> )	Initial [BrO <sub>3</sub> <sup>-</sup> ] (mol L <sup>-1</sup> )	Initial [H <sup>+</sup> ] (mol L <sup>-1</sup> )	Rate of Disappearance of BrO <sub>3</sub> <sup>-</sup> (mol L <sup>-1</sup> s <sup>-1</sup> )
1	0.00100	0.00500	0.100	2.50 × 10 <sup>-4</sup>
2	0.00200	0.00500	0.100	5.00 × 10 <sup>-4</sup>
3	0.00100	0.00750	0.100	3.75 × 10 <sup>-4</sup>
4	0.00100	0.01500	0.200	3.00 × 10 <sup>-3</sup>