# Kinetics: Obtaining a Rate Law from Experimental Data

1. Determine the rate law and rate constant for the following reaction at 450 K using the data in the table provided.

$$X + 2Y \rightarrow Z$$

Initial rate of the reaction at 450 K (M/s)	[X], M	[Y], M
0.0016	0.01	0.01
0.0048	0.01	0.03
0.0192	0.02	0.03
0.1024	0.04	0.04

2. Determine the rate law for the following reaction at 250ºC using the data in the table provided.

$$2A + B \rightarrow C + D$$
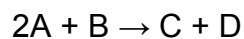
Initial rate of the reaction at 250ºC, M/s	[A], M	[B], M
0.0037	0.12	1.8
0.0148	0.12	3.6
0.0617	0.24	5.2
0.1732	0.49	6.1

Kinetics: First-Order Kinetics and the Integrated Rate Law

1. Consider the data collected for the reaction

$$A \rightarrow products$$

[A], M	Time, s
0.74	20
0.64	30
0.47	50
0.38	65

   Determine the order for the reaction.

2. The rate constant of a certain first-order reaction is 5.24×10^{-3} s^{-1}. The reaction starts with a concentration of reactant of 0.250 M. What is the concentration of the reactant after 1.50 minutes?

Kinetics: First-Order Kinetics and Half-Life

1. The half-life for the first-order conversion of cyclopropane to propene at 773 K is 17 min. What is the rate constant (in units of s^{-1}) for the reaction at the same temperature?

2. The half-life for the first-order conversion of cyclopropane to propene at 773 K is 17 min. Determine the amount of time required (in min) to convert 30% of the cyclopropane to propene.

3. A certain first-order reaction required 456 s to reduce the amount of reactant to 1/16 of its original concentration at 450 K. What is the half-life of the reaction at this temperature?