

Key for Take-Home Assignment 07

In a study of the reaction $A \longrightarrow B$, the concentration of the reactant was followed as a function of time, yielding the data shown here

time (s)	[A] (M)
10	0.1256
20	0.0997
30	0.0792
40	0.0629
50	0.0500
60	0.0397
70	0.0315
80	0.0251
90	0.0199
100	0.0158

The reaction's rate law takes the form $R = k[A]^\alpha$. Using this data, determine the rate constant, k , and the reaction order, α . Be sure to attach a plot that shows how you linearized the data and explain how you used this plot to determine k and α .

Your solution is due in class on Monday.

Answer

As each data set is unique, the solution outlined here is general and not tied to the data shown above. To determine α , find the correct way to linearize the data

if $[A]$ vs. time is linear, then $\alpha = 0$

if $\ln[A]$ vs. time is linear, then $\alpha = 1$

if $\frac{1}{[A]}$ vs. time is linear, then $\alpha = 2$

The absolute value of the slope of your linear plot gives the rate constant, k ; note that k always is a positive value.