The Rate Law - Reading Guide

*section 12.3 in OpenStax*

**The Rate Law and Concentration**

The **rate law** is a relationship between\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Rate = *k*[A]n  in this expression, *k* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

and the exponent n is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The rate constant and order of the reaction *must* be determined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If n = 1, the reaction is \_\_\_\_\_\_\_\_\_\_\_\_\_ order and the rate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the concentration of A.

Suppose the reaction A → B is first-order. Write the rate law for this reaction:

If n = 2, the reaction is \_\_\_\_\_\_\_\_\_\_\_\_\_ order and the rate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the concentration of A.

Suppose the reaction A → B is second-order. Write the rate law for this reaction:

If n = 0, the reaction is \_\_\_\_\_\_\_\_\_\_\_\_\_ order and the rate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the concentration of A.

Suppose the reaction A → B is zero-order. Write the rate law for this reaction:

**Determining the Order of a Reaction**

Work through examples 12.4 & 12.5 and explain in the space below how you would determine the order of a reaction using the **method of initial rates**.

***Watch the video tutorial on the*** [***Method of Initial Rates***](http://www.screencast.com/t/M40yej7aaUig)***.***

Determine the rate law for the reaction of 2A + B → C given the following data:

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment # | [A] in M | [B] in M | Rate (M/s) |
| 1 | 0.2 | 0.3 | 1.3 x 10-2 |
| 2 | 0.2 | 0.6 | 2.6 x 10-2 |
| 3 | 0.4 | 0.3 | 5.2 x 10-2 |

Indicate your logic:

*(ans. Rate = k[A]2[B]1)*

The **overall order** for this reaction is \_\_\_\_\_.

The **units** for the rate constant are \_\_\_\_\_\_\_.

**End of Chapter 12 Practice Problems**

#13, 15, 25

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”