Reaction Mechanisms - Reading Guide

*sections 12.6 and 12.7 in OpenStax*

**Reaction Mechanisms (section 12.6)**

A **reaction mechanism** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Each step in a reaction mechanism is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A reaction **intermediate** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in one elementary step and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in another.

Elementary steps are characterized by their **molecularity**.

Define **molecularity**:

Complete the following table to characterize each elementary step.

|  |  |  |
| --- | --- | --- |
| **Elementary Step** | **Molecularity** | **Rate Law** |
| A 🡪 products |  |  |
| A + B 🡪 products |  |  |
| 2 A 🡪 products |  |  |
| 3 A 🡪 products |  |  |
| 2 A + B 🡪 products |  |  |

The **rate-determining step** is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The rate law for the overall reaction is determined from\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is used to deduce the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

For a proposed reaction mechanism to be valid, two conditions must be met:

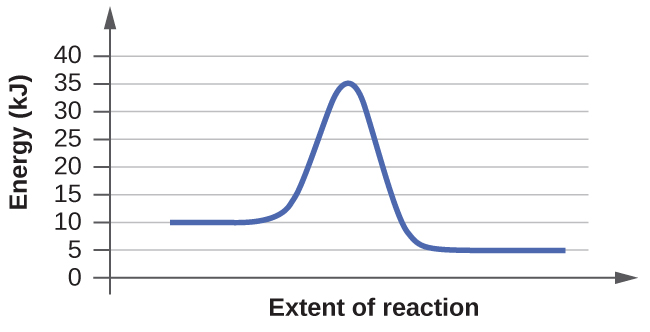
1. The elementary steps in the mechanism must sum to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The rate law predicted by the mechanism must be consistent with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Catalysts (section 12.7)**

A **catalyst** is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.**

The energy diagram below shows the uncatalyzed pathway for a reaction. Sketch a curve that could represent a catalyzed pathway that has a **two-step mechanism** with the slow step being the first step.

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In a **homogeneous catalysis**, the catalysis exists in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ phase as reactants.

In a **heterogeneous catalysis**, the catalysis exists in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ phase than the reactants.

**End of Chapter Practice Problems**

#69, 71, 73, 81

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.”