

**Topic:**

Reaction Rates and Equilibrium

**What Your Student is Learning:**

In Lesson 1, students make observations and construct explanations of how various factors affect reaction rate. They identify cause-and-effect relationships between the rate of a chemical reaction and collisions of molecules that are involved. Students use graphs as system models to show how energy is stored or released during reactions. Using the rate law, students describe how patterns in concentration changes affect the rate of a chemical reaction.

In Lesson 2, students investigate the dynamic and condition-dependent balance between a chemical reaction and the reverse reaction. They use Le Châtelier's principle to describe patterns in how the stability of a system changes in response to stresses, such as changes in concentration, pressure, and temperature. They construct explanations for these phenomena in terms of collisions of molecules and the rearrangements of atoms into new molecules. Students then plan and carry out an investigation to explore equilibrium in acid-base systems and learn how acids and bases are used in household products.

In Lesson 3, students explore patterns in natural and designed chemical systems at different scales, and they learn about the chemical reactions in a battery. Students then apply what they have learned to construct explanations of real-world problems. Students learn how the green revolution offers possible solutions to adverse effects of industry on the environment. They explore how increasing carbon dioxide levels and ocean acidification are disrupting the stability of chemical systems in the environment.

**Background and Context:**

This packet should be completed in about 30 (45-minute) sessions.

[Click here to access the Chemistry Learning Packet](#)

**Ways to Support Your Student:**

Encourage your students to talk or write about their ideas about the 4 questions above before, during, and after completing the activities. Tell them not to worry about being wrong or not knowing; science is about revising ideas over time based on new information. Students might call or video chat their classmates to discuss these ideas together as well. They should encourage each other to use evidence from the text to support their ideas.

**Additional Resource for Parents:**

[Tips for Busy Parents](#) who want to support their childrens' science learning.

**Online Resources for Students:**

**[Unit 5 - Reaction Rates and Equilibrium](#)**

Khan Academy has lessons on [Chemical Equilibrium](#) and [Acids and Bases](#) that you may find helpful.