Edgerton Center Molecule Sets

Teach abstract concepts in concrete ways

Conveys the concepts found in the Next Generation Science Standards with crosscutting lessons about matter in chemistry, biology, and earth science

The Edgerton Center Molecule Sets include 10+ lessons in chemistry, biology and earth science. Each LEGO® brick represents an atom, and brick colors are the universal CPK standard colors for elements. Students can model elements, compounds and mixtures with the bricks. They can also model more complex concepts such as chemical reactions.

Make Your Own Molecule Set

1. Download all curriculum documents for free from our website: **https://edgerton.mit.edu/molecule-sets**.

2. Purchase clear plastic boxes for the bricks (Plano 2-3600-01 11"L x 7-1/4"W x 1-3/4"H with adjustable dividers). You may choose to use other containers instead.

3. Obtain the bricks from LEGO.com, bricklink.com, or donations of used LEGO bricks. Our website lists the different numbers of bricks required for each unit: Chemical Reactions, Photosynthesis, Understanding Air, and Understanding Oceans. The 2x4 or 1x2 below indicates the number of bumps on the top of the brick. Each Molecule Kit (shared by 2 students) contains the following LEGO bricks:

- 32 blue 2x4
- 36 red 2x4
- 24 white 1x2
- 12 black 2x4
- 8 pink 2x4
- 8 yellow 2x4
- 8 light green 2x4
- 8 green 2x4
- 4 brown 2x4
- 4 grey connector pegs*
- 4 orange 2x4*
- 4 grey 2x4*

*NOTE: The grey and orange LEGO bricks and the grey connector pegs are not used often.

Molecule Sets Curriculum

Chemistry
(4-6 lessons)

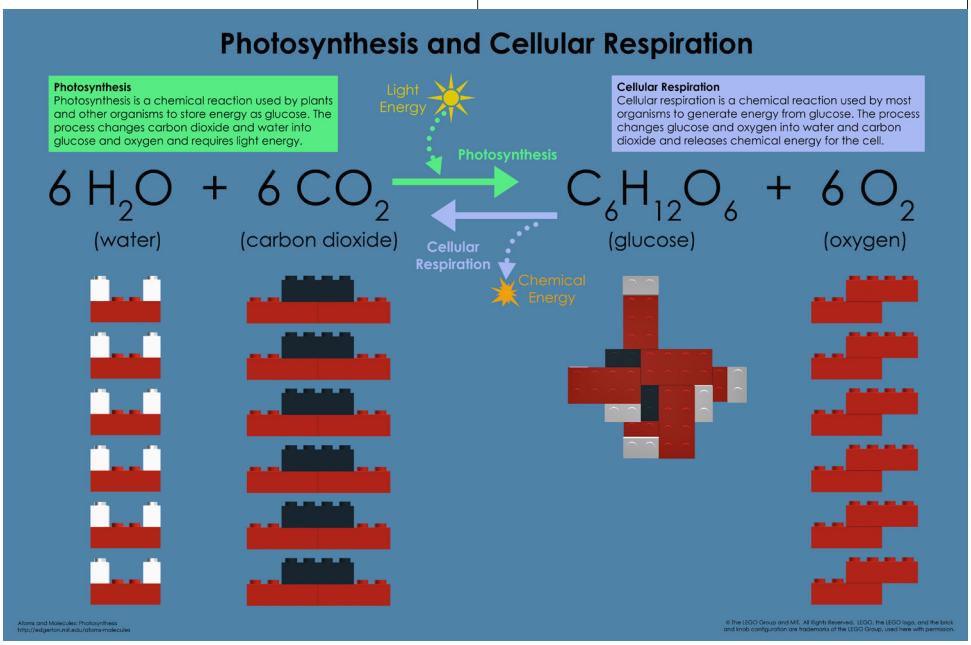
The Chemical Reactions lessons teach students that a chemical reaction is a rearrangement of atoms into new molecules.

- Students observe a real chemical reaction (calcium chloride and baking soda). Products can be separated from the mixture and compared to standards.
- Students model the reaction with LEGO atoms. They can build products from reactants to show conservation of matter.
- Students build LEGO molecules, compounds, and mixtures, and practice formula writing.

Biology
(2-3 lessons)

The Photosynthesis lessons aid students in understanding that plants create most of their mass from air.

- Students build the LEGO carbon dioxide and water into a glucose molecule, and can see exactly where those carbon atoms go.
- Glucose molecules are combined into starch and cellulose, making plant structures.
- Cellular respiration can also be modeled to show how glucose is burned with oxygen to provide energy for plant and animal cells.



Earth Science
(3-4 lessons)

The Understanding Air lessons help students visualize the molecules in air to make sense of climate change and air pollution.

- Students build a model of air and arrange the components in a pie chart with correct proportions.
- Students model the burning of fossil fuels (hydrocarbons) with oxygen and produce carbon dioxide, the major greenhouse gas contributing to climate change.
- Students model incomplete combustion producing common air pollutants hazardous to human health.

The Understanding Oceans lessons teach students about ocean acidification and pH.

- Students model how increasing levels of carbon dioxide in the air can alter chemical reactions in the ocean water.
- Short activities explain what pH numbers mean, make predictions for our ocean's future, and provide suggestions to slow down ocean acidification.
- An optional activity has students model mercury biomagnification in food webs.

Massachusetts Institute of Technology

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