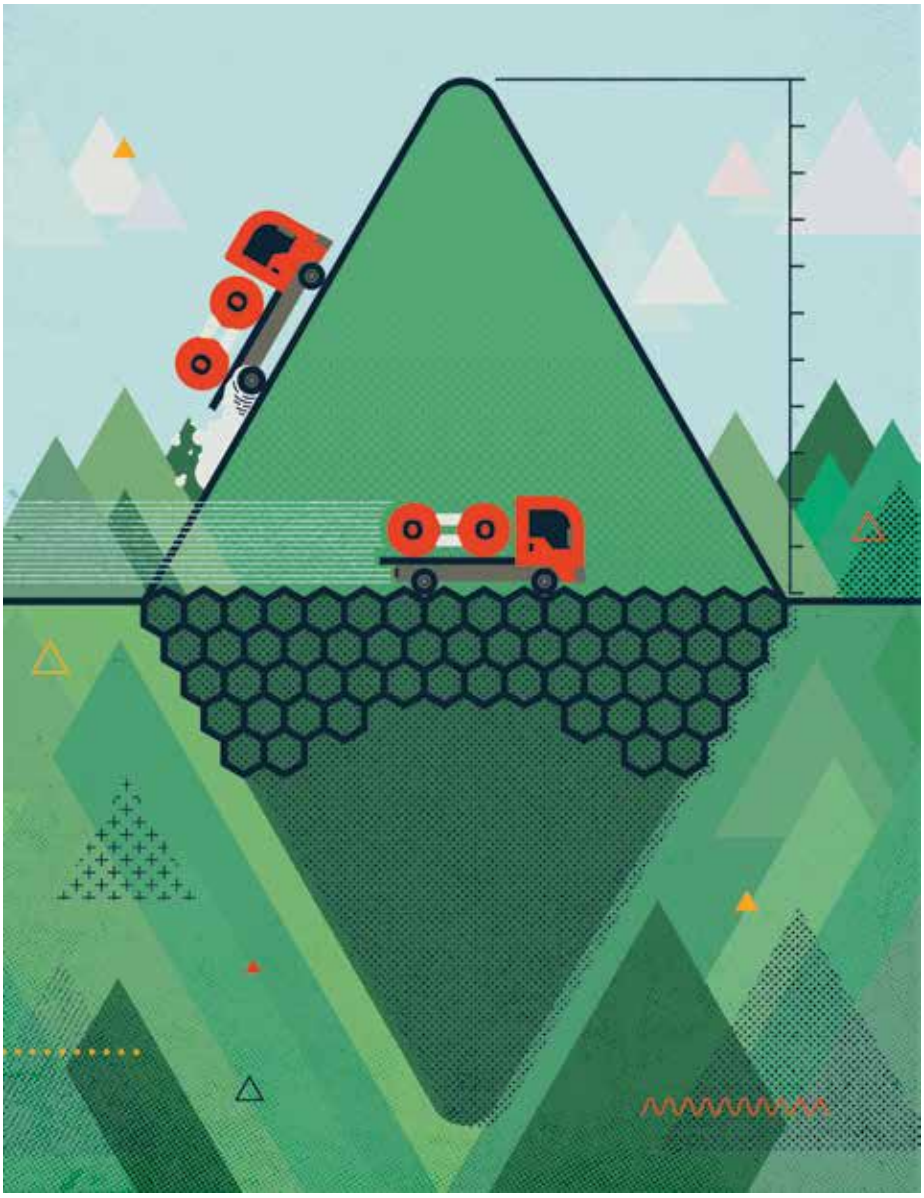
ScienceNews
IN HIGH SCHOOLS | EDUCATOR GUIDE



March 4, 2017

Built for Speed

SOCIETY FOR
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SN EDUCATOR GUIDE

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About this Issue

The article "Built for speed" (10.8 readability score) discusses how catalysts make a wide range of chemical reactions possible, and how scientists are developing improved catalysts that would be less expensive, more efficient or have other advantages. Students can focus on details in the article, follow connections to earlier articles about catalysts, explore cross-curricular connections to other major science topics and conduct their own experiments to demonstrate the ability of catalysts. *Science News for Students* provides an explainer titled "What is a catalyst?" as an additional student resource.

Want to introduce your students to an interesting STEM career related to this article? Check out Cool Jobs: Chemistry: Green and clean by *Science News for Students*.

Connections to Curricula

- Catalysts
- Enzymes
- Chemical reactions
- Activation energy
- Crystalline structure
- Engineering
- Biochemistry
- Nanomaterials
- Fuel cells

What's in this Guide?

- **Article-Based Observation:** These questions focus on reading and content comprehension by drawing on information found in the article "Built for speed." Questions focus on the use of catalysts in common industrial reactions and new research on alternatives to the precious metals currently used as catalysts.
- **Quest Through the Archives:** With Internet access and your school's digital access to *Science News*, your students can use this short section to explore the history of catalytic material technology as reported by *Science News* since 1922.
- **Cross-Curricular Discussion:** These questions and extension prompts connect to the article "Built for speed" and encourage students to think in more detail about scientific areas related to the articles. The section is subdivided roughly by science subdiscipline for educators who would like to focus on one particular topic area. The extension prompts are either more topic-specific or more conceptually advanced. **Chemistry** questions address the basics of chemical catalysts and the chemical reactions that they facilitate. **Other Physical Sciences** questions explore the energies and other physical properties of catalysts, with extensions to the catalysis of nuclear reactions. **Biological Sciences** questions focus on enzymes as biological catalysts in living organisms. **Engineering and Experimental Design** questions probe various applications of catalysts and the efficiency of their designs. A crowd-pleasing demonstration titled Elephant's Toothpaste, found at the beginning of this section, can start the catalysts discussion. This demonstration uses a catalyst to drastically increase hydrogen peroxide's rate of decomposition.

- **Activities:** This section includes two student experiments based on catalysts. **Illuminating Catalysts** has students test different types of catalysts and conditions for the light-producing luminol reaction. In **From Lactose to Glucose**, students test the effect of different conditions on lactase, an enzyme that catalyzes the conversion of lactose (milk sugar) to glucose (simple sugar).

Standards Alignment

Next Generation Science	Common Core
Matter and Its Interactions: HS-PS1-1, HS-PS1-2, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-8	ELA Standards: Reading Informational Text (RI): 1, 2, 4, 5, 7
Motion and Stability: HS-PS2-6	ELA Standards: Writing (W): 1, 2, 3, 4, 6, 7, 9
Energy: HS-PS3-1, HS-PS3-2, HS-PS3-3	ELA Standards: Speaking and Listening (SL): 1, 2, 4, 6
From Molecules to Organisms: Structures and Processes: HS-LS1-5, HS-LS1-6, HS-LS1-7	ELA Standards: Reading for Literacy in Science and Technical Subjects (RST): 1, 2, 3, 4, 5, 7, 8, 9
Earth's Place in the Universe: HS-ESS1-1, HS-ESS1-3	ELA Standards: Writing Literacy in History/Social Studies and Science and Technical Subjects (WHST): 1, 2, 4, 6, 7, 9
Earth's Systems: HS-ESS2-2, HS-ESS2-4, HS-ESS2-6	
Engineering Design: HS-ETS1-1, HS-ETS1-2	