

Catalysis: Change for the Better



Grade Level

Elementary through middle school with adult assistance.

High school

Materials

Ordinary sugar cubes
Matches
Ash
Metal plate or can lid

Discussion

Sometimes a chemical reaction won't take place, or will proceed very slowly, unless some other substance is added. That other substance is called a catalyst, which hastens the action but is not part of it and does not change. Catalysts are widely used in the chemical industry to speed up reactions. An important use of catalysts is in the making of gasoline from crude oil.

In 1949 at Universal Oil Products (now UOP), chemical engineer Vladimir Haensel developed a revolutionary process called Platforming. This breakthrough uses a platinum-based catalyst to convert

petroleum into the high-level fuels that we rely on for nearly all our transportation needs. It also produces "aromatic" petrochemicals, the raw materials used in the manufacture of plastics and fibers.

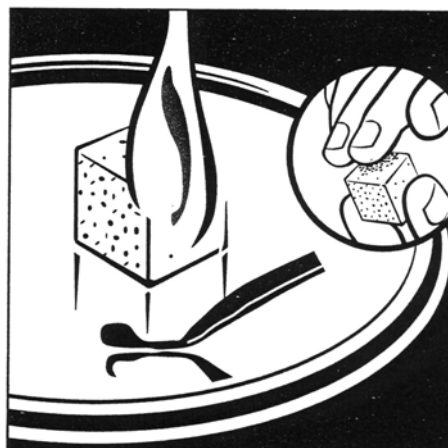
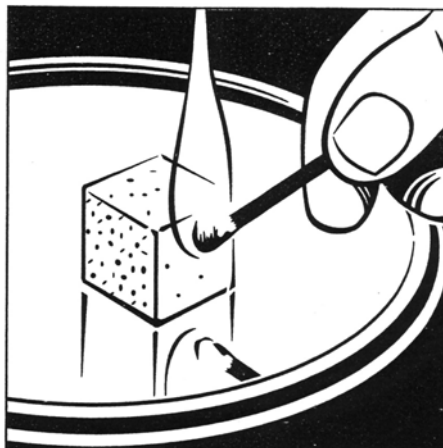
This new idea in catalysts, and the ideas that followed, have made our fuel more efficient, environmentally-friendly and easier and cheaper to produce. It has also made the plastics industry more environmentally-friendly.

In 1998, Vladimir Haensel received the Charles Stark Draper Prize, a \$450,000 award, for his work. This award is the "Nobel Prize" of engineering. It is presented by the National Academy of Engineering, with an endowment from the Charles Stark Draper Laboratory. Charles Stark Draper was an engineer and "father" of modern inertial guidance systems, used in commercial aircraft, space vehicles, strategic missiles, and submarines. Draper also developed the sophisticated navigational system that landed the Apollo astronauts on the moon and returned them safely to earth.

Activity

This activity is best done in small groups. An adult should handle the matches.

1. Place an ordinary sugar cube on a metal plate or can lid.
2. Try to set the cube on fire with a match. It won't light
3. Take a little fine ash and rub it into the cube.
4. Try to set the cube on fire. The sugar will start to melt and then burn with a pale blue flame.
5. Explain that the ash does not burn. It simply acts as a catalyst.



Discussion

Ask students to name other fuels and energy sources. Mention that sugar is one of the purest forms of energy. Discuss ways to use energy efficiently or to conserve energy. Ask students where they think energy sources may come from later in this new century.

This activity and discussion were provided by UOP for National Engineers Week 2000. Sources include Science in Action: The Marshall Cavendish Guide to Projects and Experiments, 1988, and Saucer Chemistry, by Nathan Shalit, Corsset & Dunlap, NY, 1972. To learn more about the Charles Stark Draper Prize and award recipients visit www.eweek.org.