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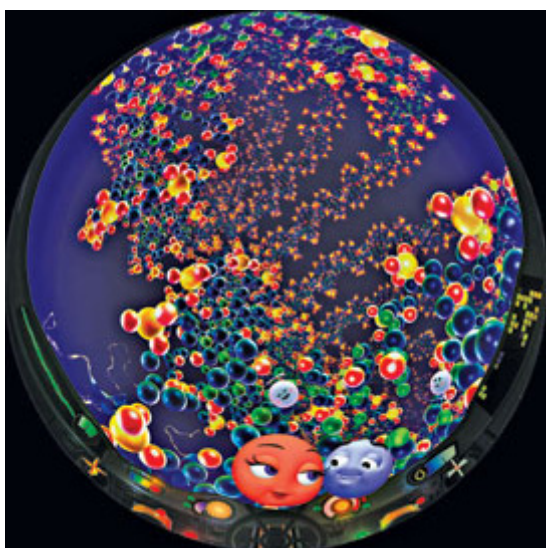
## Kids And Cartoons

### An animated molecular fantasy from the Molecularium Project teaches about chemistry

[Elizabeth K. Wilson](#)

If you grew up in the 1970s, you'll likely remember "Schoolhouse Rock," the series of Saturday morning song-and-dance cartoons that craftily indoctrinated us in civics and multiplication tables while posing as entertainment. Who could forget "I'm Just a Bill," the how-a-bill-becomes-a-law tune sung by an animated scroll dancing on the steps of the Capitol building? Or the infectious odes to adjectives, adverbs, and nouns?

No such popular ditties existed, however, for teaching us the basics of chemistry: about atoms, molecules, and chemical reactions.



Courtesy of Rensselaer/Molecularium

**Animated Atoms** Oxy the oxygen atom and Carbón the carbon atom discover the amazing world of molecules in the animated feature

## "Riding Snowflakes."

Happily, today's kids may be able to grow up thinking as fondly of oxygen, bonding, and polymers as we did of conjunctions and the Constitution. [The Molecularium Project](#), a new approach for teaching children chemistry, has similar inculcative promise. The project produces animated musicals with high-tech graphics projected onto the expansive dome of a planetarium. The viewer experiences an enveloping, 3-D-esque journey into the molecular structure of materials.

The Molecularium Project's 23-minute first show, "[Riding Snowflakes](#)," is now making the planetarium circuit around the U.S. It stars an inquisitive oxygen atom named Oxy and her two diminutive hydrogen sidekicks, Hydro and Hydra. With electrons orbiting around their midsections, the cherubic atoms travel in the Molecularium, a spaceshiplike vehicle that zips through outer space, down to the surface of a snowflake, and finally inside icy crystals. They also explore the molecular structure of chewing gum, a penny, plastic, and a cell. Along their journey, they meet life-loving Carbón, who teaches them about molecules like DNA and proteins.

"Atoms are amazing. We make everything," Oxy and Carbón trill in one of several musical numbers. Carbón's invigorating salsa number, "Carbon Is Incredible," extols the magic of element six, which you find "in your pencil leads and your diamond rings."

"Riding Snowflakes" is far more than just a glib cartoon. Not only was it made with professional artists and actors, but the computer animation is on par with major motion pictures like "Finding Nemo," and the science is painstakingly accurate, right down to the  $104.5^\circ$  bond angles of the water molecules. The expanse of molecules stretching across the planetarium dome and jiggling around as they heat up is the product of full-scale molecular dynamics simulations.

"We're conveying science in honest ways," says [Shekhar Garde](#), professor of chemical and biological engineering at Rensselaer Polytechnic Institute, Troy, N.Y., and one of the Molecularium Project's three executive producers.

[Linda S. Schadler](#), materials engineering professor at Rensselaer, got the idea for Molecularium five years ago while brainstorming for an educational outreach project for children. Schadler, who is one of Molecularium's executive producers, was inspired by the large new planetarium at the Children's Museum of Science & Technology in Troy. "The idea of being inside a material came to me," she says.

"Riding Snowflakes" made its debut at the Children's Museum, where it's still showing. It also began playing last November at the Chabot Space & Science Center in the hills of Oakland, Calif., where thousands of people have already seen the show. Last month at Chabot, Rensselaer Polytechnic Institute held a gala reception and special showing of "Riding Snowflakes."

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Before the event, Garde and [Richard W. Siegel](#), director of the Rensselaer Nanotechnology Center and another of Molecularium's executive producers, talked with C&EN about the evolution of the Molecularium Project.

With a small amount of funding, the team put together a pilot show in which the animation consisted only of basic stick figures. Still, kids who were tested after the show had grasped the concept of atoms and molecules. "It was clear that it worked even in a very crude format," Siegel says.

They then won a generous grant from the [National Science Foundation](#) and brought in the "big guns." "We wanted Hollywood-style animation," Siegel says. They hired computer animators, professional actors, singers, songwriters, and directors and writers who have worked at MTV, Nickelodeon, Showtime, and Discovery Channel.

They're continuing to assess how much chemistry children are absorbing after watching "Riding Snowflakes." Judging from the shrieks in the audience at the Chabot showing, the kids are having fun, too.

As for the future, the team members are upgrading their computer systems and raising funds for a new Molecularium show. They're also planning to translate "Riding Snowflakes" into other languages, particularly Spanish and Japanese. The project might lend itself to IMAX venues, Siegel says.

"We need a science-literate public," Schadler says. "We want to introduce some of the most basic scientific concepts so people can understand what's going on with the technology that is changing our lives."

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