

Periodic Graphics

A collaboration between C&EN and
Andy Brunning, author of the popular
graphics blog **Compound Interest**

More
online

To see more of
Brunning's work, go to
compoundchem.com.
To see all of C&EN's
Periodic Graphics,
visit **cenm.ag/
periodicgraphics**.

THE CHEMISTRY OF SLIME

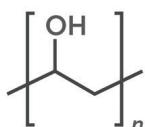
The slime-making craze is sweeping schools and homes worldwide. Here, we investigate the ingredients and science behind slime's gooey properties.



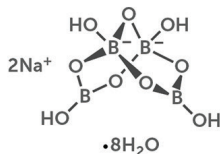
MAKING SLIME



POLYVINYL ALCOHOL



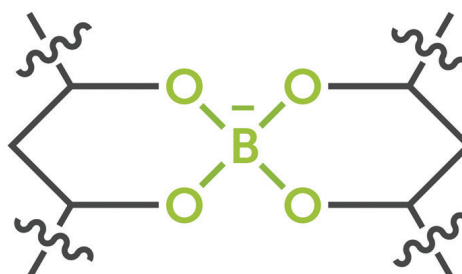
SODIUM TETRABORATE



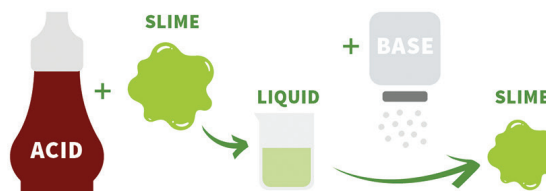
Most slime recipes use a combination of PVA glue (which contains polyvinyl acetate and polyvinyl alcohol) and laundry detergent (which contains sodium tetraborate decahydrate, or borax). In the European Union, where borax is not part of detergents, people use borax-containing contact lens solution.

SLIME'S PROPERTIES

Tetrahydroxyborate ions form cross-links between PVA polymer chains. This creates a three-dimensional network that traps water, creating a semisolid gel.



When squeezed, slime shows viscous behavior because the cross-links between its polymer chains can break and re-form. But slime will break if it's pulled apart abruptly.



Adding acids such as vinegar (acetic acid) to slime destroys the cross-linking, causing it to become a liquid. Then adding a base such as baking soda (sodium bicarbonate) neutralizes the acid, allowing the cross-links and slime to re-form.