Dear chemistry outreach enthusiast,

Thank you for downloading the Kids & Chemistry Design Slime presenter's guide! While the physical kits are no longer available, the following information may be helpful as you gather the supplies to assemble your own kit:

- The PVA solution and borax solution used in the kit are available as a set from Educational Innovations. A similar product is available through Steve Spangler Science. Look for slime kits or PVA (4%) and sodium borate (4%) solutions from your favorite science education supplier. The PVA comes in either 1 quart or 1 liter bottles.

- The turquoise color glitter paint in the kit is Colorations™ brand and is available online through Discount School Supply. You may choose different colors or effects. Any of the Colorations™ water color or glitter paints give a transparent look. I highly recommend these paints over food coloring as they do not stain skin, wipe up easily off counter tops, and easily wash out of fabrics. The colors are really vibrant, too. Other paints in this brand, such as the metallics, work well and give a nice texture and appearance to slime, even though the slime loses its transparency. I have had mixed results with other brands of washable paints and glues. For example, some brands I have tried do not dissolve well in the PVA solution, giving an unpleasant chunky appearance and texture. Others work well. Definitely test on your own before purchasing anything in quantity or using the product with students.

- The jumbo (8 mL) droppers are from SKS Science. These are handy because an average draw is about 5 mL—the ideal amount to make the slime described in the Design Slime booklet.

- Mardi Gras beads are used for the molecular modeling portion of the activity. As written, the beads are used as a demonstration. So the presenter is the only one handling the beads. If you would like students to be able to build and keep their own molecular model of the "bones" of slime, find or purchase additional Mardi Gras beads. Many different types work. The only difficulty I have encountered is when trying to use two different types of beads for the PVA and chemical connector—different colors are good; different shapes or sizes of beads are bad.

- You can purchase the 2-ounce oval containers (with secure-fitting lids) provided in the kit, from online restaurant suppliers. Search using the words Newspring, Ellipso and Pactiv to find the containers provided in the kit. My son backpack-tested these and other small containers filled with slime. The 2-ounce oval containers provided in the kit exceeded our expectations holding up the entire two entire weeks of our backpack trial. Snack-sized zip-closing plastic bags performed well, too. But there is something more official about the oval containers. Beware of the portion cups with polystyrene lids available at most grocery stores!

Please email p_galvan@acs.org if you have additional questions about the materials or the lesson.

Best Regards,
Patti

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Design Slime

Enrichment activity for social-distanced or on-screen presentations

Celebrate chemistry by making slime! Begin with a blue polyvinyl alcohol (PVA) solution that no amount of shaking will transform. Experienced slime-makers know they need to add something to get the liquid to change—but what? Use strands of party beads to represent PVA molecules and model the changes that take place with the addition of a bond breaker and with a chemical connector. Makers implement their new knowledge to create the slime of their dreams.

Question to investigate

Should you choose a bond breaker or a chemical connector to make good slime?

Chemistry concepts

- Polymers, such as polyvinyl alcohol, are long molecules made up of repeating units.
- Sodium tetraborate (Borax™) connects PVA molecules to slow the flow of the liquid.
- The amount of sodium tetraborate (chemical connector) used affects the properties of the resulting slime.

Activity logistics

- **Ages**: This activity is best suited for students ages 6-12.
- **Group Size**: This activity contains enough supplies for up to 25 people to make their own slime without having to share materials. If the presenter reserves one set of supplies to model what to do, a maximum of 24 students will be able to make slime.
- **Set-up**: Follow the instructions on pages 5 and 6 to prepare materials in individual bags for each student.
- **Be sure to distribute supplies to each student in a way that respects social distancing and other best practices to prevent the spread of disease.**
- **Facilitators**: Aside from the lead presenter, adult participation and supervision is required in each physical location.

Supply list

What you'll need

Included in the kit

- 1 bottle polyvinyl alcohol solution 4%, 32-oz or 1 liter size
- 1 bottle sodium borate solution 4%, 8-oz or 250 mL size
- 1 bottle Colorations® washable glitter paint, 473 mL size
- 25 small plastic beakers, 90 mL size
- 25 stirring rods
- 25 jumbo pipets, 8 mL volume
- 1 medicine cup, 30 mL size
- 25 small containers with lids 2-oz, 60 mL size
- 25 slime safety cards
- 12 Mardi Gras bead necklaces (blue)
- 2 Mardi Gras bead necklaces (gold)

Other necessary supplies

- 4 clear plastic cups
- 1 permanent marker
- Tealight candle
- Lighter
- 1 mug, bowl, or container
- Scissors
- Paper towels
- 25 zip-closing plastic bags, gallon size
- Safety glasses or splash goggles for each child, supervising adult, and the presenter
- Nitrile gloves (not latex) for all,
    - x-small, small, or medium sized gloves for students
    - medium, large, or x-large for adults and the presenter


Notes about the materials

- This activity uses polyvinyl alcohol. White glue and clear glue, used in other slime recipes, contain polyvinyl acetate. Both polymers play a similar role in slime.
- Jumbo pipets are recommended for this activity because one draw of solution is about 5 mL. This makes dispensing and distributing the sodium borate solution easier.

Safety

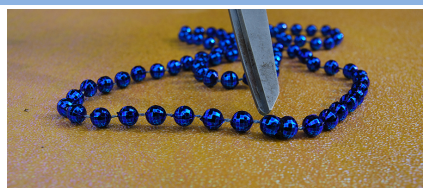
Safety suggestions

- Tie back long hair and secure loose clothing.
- Wear safety glasses or splash goggles as your prepare the materials and present the activity. This activity is designed to minimize splashes and contact with the dilute sodium borate and PVA solutions during the making phase of the activity.
- Disposable non-latex gloves are highly recommended because there have been rare but severe incidents of chemical burns related to making and playing with slime. While dilute solutions are used in this activity to minimize risk, wearing gloves nearly eliminates the risk of adverse effects due to exposure.
- Do not eat or drink food when conducting this activity or when playing with slime.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Thoroughly wash hands after preparing supplies, after conducting the activity, and both before and after playing with slime.
- Additional safety information is located at the end of this booklet.

Storage and disposal

- Store slime in the small plastic container provided in this activity or in a snack-sized zip-closing plastic bag. The idea is to keep slime clean and prevent the water from evaporating away. Do not refrigerate this slime. It contains a preservative to inhibit the growth of mold and bacteria. Store slime away from food and out of reach of young children to prevent accidental ingestion.
- Reuse the plastic beaker, plastic stirring rod, and small container for future science activities. Do not use these items to prepare or store food.
- Dispose of remaining items with the household trash.

Prepare the activity



Make molecular models

1. Look for the section on a Mardi Gras necklace where two beads are fused together. Use scissors to remove the fused beads, leaving one very long strand of evenly spaced beads. Do this for all 12 blue and 2 gold Mardi Gras bead necklaces.

2. Cut the two gold necklaces into 4-bead lengths. You should be able to get about 20 pieces per strand.
3. Hold two gold 4-bead length pieces together like the letter "X". Press in place and twist together twice. These tetrahedral pieces represent tetraborate ions (chemical connectors). Assemble 16 tetrahedral pieces.
4. Use a permanent marker to label four clear plastic cups *PVA*, *BB*, *CC,* and *XCC*.
5. Prepare the cups and beads as follows:

Cup	Instructions	What this represents
PVA Polyvinyl alcohol	● Place 3 strands of blue beads in the cup labeled PVA.	3 PVA molecules
BB Bond Breaker	● Cut each of 3 strands of blue beads into fourths for a total of 12 pieces. ● Place these pieces in the cup labeled BB. 	PVA and bond breaker
CC Chemical Connector 	● Pick up 3 strands of blue beads, ball them up in your hands and drop them on a flat surface. Spread the clump out with your fingers to resemble a loose tangle. ● Press one of the legs of a gold tetrahedral piece between two blue beads from the loosely tangled clump. Secure the connection, by twisting the beads perpendicular to one another, twice. Similarly, connect the three remaining ends of the gold tetrahedral piece into different portions of the blue tangle. ● Continue this process with 4 additional tetrahedral pieces. Place this clump of beads into the cup labeled CC.	PVA crosslinked with tetraborate ions
XCC Extra Chemical Connector	● Make another clump with 3 strands of blue beads and 10 gold tetrahedral pieces.	PVA with more crosslinks

Prepare individual sets of materials

Make double-sided copies of the activity instructions and safety information, found on the last page of this booklet, for each participant.

Portion out the PVA solution

1. Arrange the provided 25 oval containers on a table or countertop.
2. Use one beaker to pour 20 mL of PVA solution into each oval container.
3. Squirt approximately 10 mL of washable glitter paint into each container.
4. Cover each container with a lid and press to snap in place.
5. There is no need to shake the contents of each sealed container.

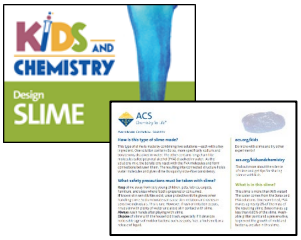
Portion out the sodium tetraborate solution

1. Each jumbo dropper has a volume of 8 mL. However, only 5 mL are needed to make this slime. An average draw of sodium borate solution into the dropper is about 5 mL. Use a medicine cup to practice drawing close to 5 mL of sodium borate solution each time.
2. Once your process is established, draw approximately 5 mL into a dropper. Place the dropper bulb-side down in a mug, bowl, jar, or other container. Similarly fill the remaining 24 bulbs. If you add extra sodium borate solution just to be sure, the resulting slime will be too stiff—not enough results in slime that is too sticky. Do your best to keep the amount at 5 mL.
3. Seal the tips of each bulb using the following method:
    - Place a tealight candle on a flat nonflammable surface. Use a lighter or match to light the candle.
    - Keeping the bulb of the dropper lower than the tip, tilt the dropper so that the tip is near, but not in, the flame.
    - Rotate the dropper tip near the flame for about 20-30 seconds in order to soften the plastic.
    - Move the dropper away from the flame and crimp the tip closed with a pair of pliers. If the tip does not seal, repeat the process.
    - Place the dropper bulb-side down in a mug and allow the fused plastic to cool.

Pack 24 sets of supplies

1. Use a permanent marker to write each student's name on a separate zip-closing plastic bag.
2. Place each of the following in the bag for each student:
    - 1 small plastic beaker
    - 1 filled and sealed dropper containing sodium borate solution
    - 1 oval container containing PVA solution and glitter paint
    - 1 plastic stirring rod

    - 1 pair of properly-fitting non-latex gloves for each person participating in the activity.
    - Select from sizes x-small, small, or medium for students ages 6-12 and sizes medium, large, or x-large nitrile gloves for adults.
    - 1 student- and 1 adult-sized pair of safety glasses or splash goggles
    - Seal all 24 bags.
3. Place one *Kids & Chemistry Design Slime* safety card and one page of activity instructions in each bag. If you are making your own kit, the information on this card is on the last page of this booklet and can be photocopied onto the back of the student worksheet.



4. Distribute one bag of supplies to each student-adult pair participating in the activity.

Facilitate the activity

Invite participation

1. **Have children tell you about their experiences making slime.**
   - Have you made slime before? *Yes!*
   - What are some characteristics of good slime? *It is thick and stretchy.*
   - What kinds of slime have you made before? *Responses will vary.*

2. **Introduce the problem—runny slime!**
   Take your supplies out of the bag. Do not open the container of blue liquid. This is the liquid that we are going to transform into slime. Keep the lid tightly sealed on the container and tilt the container to observe the flow of the liquid.
   - How is this different from slime?
     This is watery like a liquid.

Now let's make slime! Hold the lid on your container as you shake it. Keep on shaking!
- Is it slime yet? *No*
- How do you know? *It's still like a liquid*
- This does not seem to be working. Some of you have made slime before. What is the problem? What else could we try?
  You need to add something that will make the slime thicker, like borax, contact lens solution, laundry detergent, or liquid laundry starch.

I do not want to try something that may or may not work. This is all the slime starter we have. I want each person here to end up with a great piece of slime. Chemistry can help us figure out what to add so that everyone ends up with great slime!

Deepen Understanding

3. **Use models to take a closer look at PVA.**
   You made some great observations of the slime starter, but no one said anything about the atoms and molecules. This is because they are too small to see.
   Chemists specialize in atoms and molecules. Yet, we can't see them, not even with a very powerful microscope. One strategy we use to understand the tiny world of atoms and molecules is to use models.

[Remove one strand of beads from the PVA cup.] Your blue liquid is made mostly of water. It has some blue color and glitter in it, but slime can be made without it, so we are going to skip the water, color, and glitter in our model. This will allow us to focus on the part that gives slime its structure—polyvinyl alcohol or PVA for short.

- What do you notice about this molecule?
  It is long and thin, has many beads that look the same on it, and it is flexible.
- What are some of the sources of PVA that you use to make slime?
  White glue, clear glue, special liquid from a slime kit.

This long skinny shape with repeating groups of atoms is what makes the PVA molecule a **polymer**.

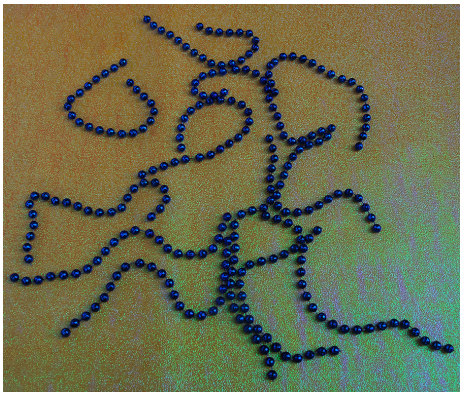
[Pull all three of the polymers (strands of beads) out of the PVA cup and try to play with them like slime. Try to get the strands to flow from one hand down to the other.]

- Can shaking these polymers make them flow more like slime? *No*
- Who thinks that we need to add something to the PVA?
  You are right!
- Next, we need to figure out which type of chemical to add.
  Should we use a *bond breaker* or a *chemical connector* to change PVA into slime?

4. Use models to explore whether to add a bond breaker or a chemical connector to the PVA.

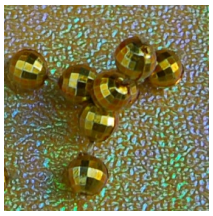
Here is a model of what happens when a **bond breaker** is added to PVA.
[Pick up one pair of scissors to represent a bond breaker.]

Adding a bond breaker cuts the polymers into smaller pieces.
[Cut in a couple of places to show what a bond-breaking chemical might do. Then put down the scissors and pour the remainder of the contents of cup BB into your hand. Try to play with the pieces like slime.]



- Will adding a bond breaker to the polymer make thick and stretchy slime? *No.*
- Why do you think this?
  The pieces fall apart.
  Slime does not fall apart like this.

Here is a model of what happens when a **chemical connector** is added to PVA.



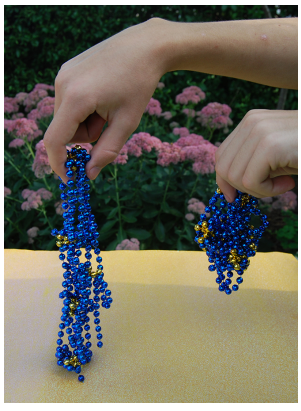
[Pick up one tetrahedral piece.]
This chemical connector has four areas that each connect to a part of a polymer.

[Pour the contents of cup CC into your hand. Show a gold chemical connector attached to blue polymers. Then drop part of the clump down to your other hand. Play with the clump of beads like slime.]

- Will adding a chemical connector to the polymer make thick and stretchy slime? *Maybe. Yes.*
- Why do you think this? *It holds together, flows, and stretches like slime.*
- Should we add a bond breaker or a chemical connector to the PVA? *Chemical Connector*!
- What are some of the chemical connectors you use when you make slime?
  Contact lens solution, liquid starch, laundry detergent and Borax™.

These different products contain the same chemical connector—sodium borate. Look at the tiny words in the ingredient list and if you see sodium borate on the list, you may be able to use the product to make slime. Before you try it out, remember to get permission from an adult before using any of *their* household supplies for science experiments. Also, be sure to do your experiment with an adult's supervision.

5. Compare two models of PVA with different amounts of chemical connector added.



[Hold the model from the CC cup in one hand and the model from the XCC cup in the other.]

- What is the difference between these two models of slime?
  One has more chemical connectors than the other. The one with fewer chemical connectors is looser and can stretch.
- *The one with more chemical connectors is tighter and does not stretch as much.*

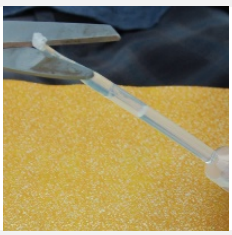
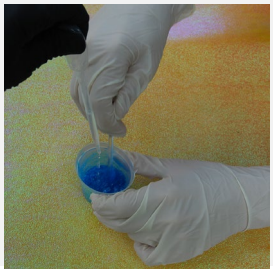
[Put down the model with 5 chemical connectors. Then try to play with the model with the 10 chemical connectors to confirm students' ideas.
The amount of chemical connector you add when making slime is going to make a difference in what your slime will be like. When making slime, we need to think of two things when adding a chemical to PVA. 1) You need to add a chemical connector; and 2) You need to add the amount that will give the amount of stretch you want.

Support Exploration

6. **Make slime!**

   [Put on your safety glasses or splash goggles and gloves and instruct children and their adults to do the same.]

   It is important to be safe, including when doing chemistry. So put on safety glasses or splash goggles to protect your eyes. Also, put on disposable plastic gloves to protect your skin. The chemical connector, sodium tetraborate also known as Borax™ solution might irritate your skin.

Instructions for students	Instructions for adults
1 Pour all of the blue liquid into the small beaker.	Hold the dropper bulb-side down. Use scissors to cut off the sealed tip. 
2 Hold the beaker on a flat surface with one hand. Use a stirring rod to stir the liquid continuously with the other hand.	 While your student is stirring, gradually add the entire contents of the dropper into the blue liquid.
3 Pull your stick up out of the beaker and pull the slime off the stirrer. 	Dispose of the dropper with the household trash.
4 Press, squeeze, and stretch your slime. The more you play with it, the less sticky it will be.	Use a paper towel to wipe the stirring rod clean. Reuse it in future science experiments.

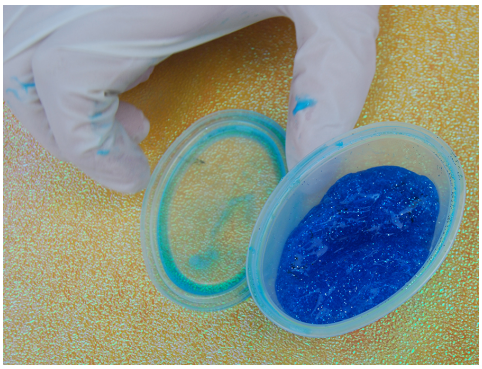
Deepen Understanding

7. **Compare actual slime to the model.**
   [Stretch and play with the model of slime from cup CC as students play with their actual slime.]
   Real slime like yours is mostly made of water, so this model is not perfect.

In your slime, the water molecules allow the polymers to slide around so that your slime can flow and stretch.

- How far can you stretch your slime?
  Students can stretch their slime until it breaks.
- In real slime, the chemical connections between the borate and PVA can easily break and then reconnect in a different place.
- Can you show me evidence that new connections can form again?
  If you place two pieces together they will fuse.

8. **Conclude your presentation.**
   When you are done playing with your slime, be sure to store your slime in the container with the lid snapped. If you keep your slime clean and prevent the water molecules from evaporating, your slime will last for a month or more. However, if at any time your slime begins to stink, grow fuzz, or develop a watery layer on top, throw the slime away in the trash! These are all signs that bacteria are growing in your slime. Keep your slime clean by washing your hands before playing with it. Also, wash your hands after playing with slime, even if you wear gloves. This will protect you and everything you touch.



   Thanks for making slime with me. I hope you will use your new knowledge of chemistry the next time you make slime!

Clean-up

9. **Give clean-up instructions.**
   To clean the small beaker for reuse later in other science experiments, set it out on the counter overnight and allow the remaining slime to dry. The next day, it will flake off easily. Wash the beaker with warm soapy water, air dry, and store it with your science supplies.

RAMP Risk Management and Safety Information
for Kids & Chemistry Design Slime

What happens? Who does it?	Recognize hazards	Assess risk	Minimize risk	Prepare for emergencies
Seal the dropper tip. (Presenter)	• Dropper may catch fire. • Fire may spread or burn person.	Medium	• Use tealight candle on non-flammable flat surface. • Hold tip near flame for 20-30 seconds. • Use pliers to squeeze tip. • Tie back long hair and loose clothing.	• Cover with pan lid or damp kitchen towel to extinguish fire.
Shake PVA and paint solution. (Student)	• PVA sol'n could spill or splash	Medium	• Use containers with secure-fit lids • Check fit and hold lid on container while shaking	• Absorb liquid with paper towels and dispose with the household trash.
Pour PVA from container to beaker. (Student)	• PVA sol'n could spill or splash • PVA may irritate skin	Medium	• Wear gloves and safety glasses or splash goggles	• Absorb liquid with paper towels and dispose with the household trash.
Snip off bulb tip with scissors. (Adult)	• Borax sol'n may contact skin • May cause mild to severe skin irritation	Medium	• Hold bulb-side down to snip and until use.	• Wash affected area. • If rash develops, rinse with water for 15 minutes.
Use dropper to gradually add borax solution to PVA. (Adult & Child)	• Borax sol'n may contact skin • May cause mild to severe skin irritation	Medium	• Turn dropper over beaker.	• In the case of a severe reaction, seek immediate medical attention.
Stir contents of beaker. (Child)	• Could spill or splash • May cause mild to severe skin irritation	Medium	• Wear gloves and safety glasses or goggles. • Hold beaker on a flat surface with one hand and stir with the other.	• Absorb liquid with paper towels and dispose with the household trash.
Pull slime off stirring rod. Press and stretch slime. (Child)	• Contact will occur • May cause mild to severe skin irritation	Medium	• Wear gloves and safety glasses or goggles.	• Wash affected area. Wash hands after cleaning up from activity and disposal of gloves
Store slime in container. (All)	• Someone may confuse slime with food. • Choking hazard.	Medium	• Keep away from food and young children.	• Remove slime from mouth. • Use 5-and-5 method until slime is dislodged and person is breathing. • If unconscious or blockage persists, 911.

Revision Number: 001.3 **Issue date:** 04/09/2018

1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

Product identifier used on the label: 20 Mule Team Borax

Recommended use of the chemical and restrictions on use: Universal

Name, address and telephone number of the chemical manufacturer:
Educational Innovations, Inc.
5 Francis J. Clarke Cir.
Bethel, CT 06801

Telephone: For medical emergencies 1-833-359-6299 For transportation: 1-800-424-9300

2. HAZARDS IDENTIFICATION

The hazards described in this Globally Harmonized System Safety Data Sheet (SDS) are not intended for consumers, and does not address consumer use of the product. For information regarding consumer applications of this product, refer to the product label.

Classification of the substance or mixture in accordance with paragraph (d) of §1910.1200

HAZARD CLASS	HAZARD CATEGORY
SKIN IRRITATION	2
EYE IRRITATION	2A
REPRODUCTIVE TOXICITY	2

Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200

Signal word: WARNING

Hazard Statement(s):
Causes skin irritation.
Causes serious eye irritation.
Suspected of damaging fertility or the unborn child.

Symbol(s):

Precautionary Statements:

Prevention:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wash thoroughly after handling.
Wear eye and face protection.
Wear protective gloves.
Use personal protective equipment as required.

Response:
IF ON SKIN: Wash with plenty of water.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical attention.
If skin irritation occurs: Get medical attention.
If eye irritation persists: Get medical attention.
Take off contaminated clothing.

Storage:
Store locked up.

Disposal:
Dispose of contents and/or container according to Federal, State/Provincial and local governmental regulations.

Hazards not otherwise classified: None known

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

See Section 11 for additional toxicological information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

The following chemicals are classified as health hazards in accordance with paragraph (d) of § 1910.1200.

Chemical Name*	CAS Number (Unique Identifier)	Concentration
Sodium tetraborate decahydrate	1303-96-4	60 - 100 %

*The specific chemical identity and/or exact percentage (concentration) of composition has been withheld because a trade secret is claimed in accordance with paragraph (i) of §1910.1200.

4. FIRST AID MEASURES

Description of necessary measures

Inhalation: Remove from exposure area to fresh air. Treat symptomatically and supportively.

Skin contact: Rinse affected area with large amounts of water until no evidence of product remains. Get medical attention if irritation persists.

Eye contact: Immediately rinse eyes with plenty of water for at least 15 minutes while holding eyelids open. Get medical attention if pain or irritation develops.

Ingestion: Dilution by rinsing the mouth and giving water or milk to drink is generally recommended. Contact physician or local poison control center.

Most important symptoms and effects, both acute and delayed

After eye contact: Moderate to strong irritation of the eyes (redness, swelling, burning, watering eyes), the occurrence of these symptoms may be delayed.

After skin contact: May cause moderate to severe irritation. After Ingestion: Ingestion may cause pain, burning, swelling and redness in the mouth and throat. Nausea and vomiting may occur. After inhalation: Dust may cause mucous membrane irritation with coughing and shortness of breath.

Indication of any immediate medical attention and special treatment needed

After eye contact: Rinse eyes immediately with plenty of water, occasionally lifting upper and lower lids, until no evidence of product remains. After skin contact: Rinse affected area with large amounts of water until no evidence of product remains. After ingestion: May be fatal if swallowed and enters airways. Dilution by rinsing the mouth and giving a glass of water to drink is generally recommended. After inhalation: Remove from exposure area to fresh air. Contact physician or local poison control center.

5. FIRE FIGHTING MEASURES

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Extinguish using agent suitable for type of surrounding fire. Product is fire retardant.

Unsuitable extinguishing media: None known

Specific hazards arising from the chemical

Thermal decomposition products may include toxic oxides of sodium and boron.

Special protective equipment and precautions for fire-fighters

In case of fire, wear a full-face positive-pressure self-contained breathing apparatus and protective suit. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Avoid breathing vapors, keep upwind. Isolate area. Keep unnecessary personnel away.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Wear skin, eye and respiratory protection as recommended in Section 8. Stop leak if you can do it without risk. Spills present a slipping hazard. Keep unnecessary personnel away. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Make sure area is slip-free before re-opening to traffic.

Environmental precautions

Small or household quantities may be disposed in regular domestic trash. For larger quantities check with your local disposal authorities.

Methods and materials for containment and cleaning up

SMALL SPILLS: Sweep or scoop up and place into containers for later disposal. Wash site of spillage thoroughly with water.
LARGE SPILLS: Sweep or scoop up and place into suitable clean, dry containers for reclamation or later disposal. Dispose in suitable waste container. Keep unnecessary people away from spill.

7. HANDLING AND STORAGE

Precautions for safe handling

Do not get in eyes, on skin, on clothing Do not take internally. Use with adequate ventilation.

Conditions for safe storage, including any incompatibilities

Store in original containers in a cool dry area. Storage areas for large quantities (warehouse) should be well ventilated. Keep the containers tightly closed when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.

Hazardous Component(s)	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Sodium tetraborate decahydrate	2 mg/m3 TWA Inhalable fraction. 6 mg/m3 STEL Inhalable fraction.	None	None	None

Appropriate engineering controls

Provide local exhaust or general dilution ventilation to keep exposure to airborne contaminants below the permissible exposure limits where mists or vapors may be generated.

Individual protection measures

Respiratory: If respiratory protection is required, it must be based on the contamination levels found in the workplace, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

Eye: Safety glasses are required to prevent eye contact where dusty conditions may occur.

Hand/Body: Protective gloves are required where repeated or prolonged skin contact may occur. Protective clothing is required where repeated or prolonged skin contact may occur.

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
Polyvinyl alcohol, 5-30% solutions
Trade Names
The following specific grades are covered by this SDS: 15-103, 21-103, 08-125, 09-325
Synonyms
Polyvinyl alcohol, PVA
Chemical Family
Ethenol, homopolymer
Product Use
Intermediate, surfactant, adhesives, Food/foodstuff additives, Packaging materials, Auxiliary for leather, Auxiliary for textile.
Restrictions on Use
None known.
Details of the supplier of the safety data sheet
Educational Innovations, Inc.
5 Francis J. Clarke Cir.
Bethel, CT 06801

Emergency Phone Numbers:
In USA: CHEMTREC 800-424-9300
Outside USA: CHEMTREC 703-527-3887 (collect calls accepted)
Phone: +1-972-277-2900

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Skin Sensitization - Category 1
GHS Label Elements
Symbol(s)

Signal Word
Warning
Hazard Statement(s)
May cause an allergic skin reaction.
Precautionary Statement(s)
Prevention
Avoid breathing dust/fume/gas/mist/vapours/spray.
Contaminated work clothing must not be allowed out of the workplace.
Wear protective gloves.

Response
IF ON SKIN: Wash with plenty of soap and water.
If skin irritation or rash occurs: Get medical advice/attention.
Wash contaminated clothing before reuse.
Specific treatment (see label).
Storage
None needed according to classification criteria.
Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
7732-18-5	Water	70.0-95.0
9002-89-5	Polyvinyl alcohol	5.0-30.0
127-09-3	Sodium acetate	0.01-0.1
79-20-9	Methyl acetate	0.001-0.1
67-56-1	Methyl alcohol	0.001-0.1
55965-84-9	5-Chloro-2-methyl-3(2H)-isothiazolone, mixture with 2-methyl-3(2H)-isothiazolone	0.0038

Section 4 - FIRST AID MEASURES

Description of Necessary Measures
Wash thoroughly after handling.
Inhalation
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin
Wash with plenty of soap and water. If skin irritation or rash occurs, seek medical advice/attention. Wash contaminated clothing before reuse.
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
Ingestion
If a large amount is swallowed, get medical attention.
Most Important Symptoms/Effects
Acute
May cause an allergic skin reaction.
Delayed
May cause an allergic skin reaction.

Indication of any immediate medical attention and special treatment needed
Treat symptomatically and supportively.
Note to Physicians
Treat symptomatically and supportively.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
The product itself does not burn in solution. dry polymer: Use dry chemical, carbon dioxide, alcohol-resistant foam or water spray.
Unsuitable Extinguishing Media
Do not scatter spilled material with high-pressure water streams.
Special Hazards Arising from the Chemical
carbon monoxide, carbon dioxide.
Advice for firefighters
Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.
Fire Fighting Measures
Keep unnecessary people away, isolate hazard area and deny entry. Do not enter confined spaces unless adequately ventilated. Cool containers with water spray until well after the fire is out. Keep away from heat, sparks and flame.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Keep unnecessary people away, isolate hazard area and deny entry. The mixture is slippery when wet. Avoid contact with skin and eyes.
Methods and Materials for Containment and Cleaning Up
Use approved industrial vacuum cleaner for removal. Absorb spillage to prevent material damage. Collect in closed and suitable containers for disposal.
Environmental Precautions
Prevent environmental discharge consistent with regulatory requirements.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Use only outdoors or in a well-ventilated area. Spilled polymer solution is very slippery. Use care to avoid falls. Wash thoroughly after handling.
Conditions for Safe Storage, Including any Incompatibilities
None needed according to classification criteria.
Protect from freezing. Store at room temperature. Store in original container.
Incompatible Materials
Oxidizing agents, acids, peroxides, perchlorates, nitrates, reactive metals.

KIDS AND CHEMISTRY

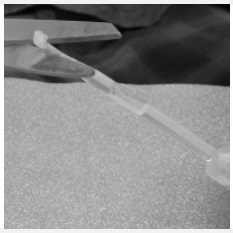
Design SLIME

Prepare

Clean your work surface and wash your hands with soap and water both before and after making slime—*before*, keeps your slime clean and *after* keeps everything else clean. In addition to the bag of supplies for this activity, you will need one pair of scissors and a paper towel.

Procedure

This is a two-person activity! Both a student and adult must work together to make this slime. Please wait for the presenter to give the instructions before doing each step.

	Instructions for students	Instructions for adults
1	Pour all of the blue liquid into the small beaker.	Hold the dropper bulb-side down. Use scissors to cut off the sealed tip. 
2	Hold the beaker on a flat surface with one hand. Use a stirring rod to stir the liquid continuously with the other hand.	 While your student is stirring, gradually add the entire contents of the dropper into the blue liquid.
3	Pull your stick up out of the beaker and pull the slime off the stirrer. 	Dispose of the dropper with the household trash.
4	Press, squeeze, and stretch your slime. The more you play with it, the less sticky it will be.	Use a paper towel to wipe the stirring rod clean. Reuse it in future science experiments.

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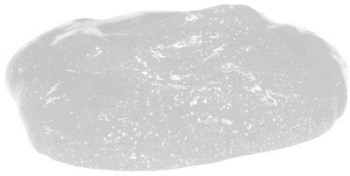

How is this type of slime made?

This type of slime is made by combining two solutions—each with a key ingredient. One solution contains Borax, more specifically sodium and borate ions, dissolved in water. The other contains long chain-like molecules called polyvinyl alcohol (PVA) dissolved in water. As the solutions mix, the borate ions react with the PVA molecules and form connections between them. The resulting interconnected structure holds water molecules and gives slime its squishy slow-flow consistency.

What safety precautions must be taken with slime?

Keep slime away from very young children, pets, fabrics, carpets, furniture, and areas where food is prepared or consumed.
If known skin sensitivities exist, wear protective nitrile gloves when handling slime. Sodium borate can cause skin irritation and rashes in sensitive individuals. This is rare. However, if rash or irritation occurs, rinse skin with plenty of water and avoid skin contact with slime.
Always wash hands after playing with slime.
Dispose of slime with the household trash, especially if it develops noticeable signs of mold or bacteria such as spots, fuzz, a foul smell, or a release of liquid.

acs.org/kids

Do more with slime and try other experiments!

acs.org/kidsandchemistry

Find out more about the science of slime and get tips for sharing science with kids.

What is in this slime?

This slime is more than 96% water! The water comes from the Borax and PVA solutions. Once combined, PVA makes up nearly 2% of the mass of the resulting slime. Borax makes up less than 0.5% of the slime. Wash able glitter paint and a preservative, to prevent the growth of mold and bacteria, are also in this slime.

Clean up tips

- Put your slime in the container and snap the lid in place.
- Clean your work surface.
- Allow the remaining slime in the beaker to dry overnight.
    - Once dry, the thin film will flake off easily.
    - Then you can wash the beaker with soap and water for reuse.
- Remove your gloves and throw them away with the household trash.
- Wash your hands with soap and water.
- Remove your safety glasses or splash goggles after you finish cleaning up.