Slime Investigation

TEACHER WORKSHEET
Level 5-10

OBJECTIVES

1. Investigate cross-linking properties of a polymer
2. Observe and compare characteristics resulting from the use of varying concentrations of solutions
3. Identify the most effective/favourable material based on observations

BACKGROUND INFORMATION

A glue such as PVA is an example of a polymer that forms an emulsion in water. Polymers are very large molecules, formed by repeated patterns of chemical units strung together. If a Borax solution is added to a PVA solution then a 'cross-linking' reaction occurs that binds the polymer chains together to make the PVA solution thicken and become a gel. As the polymer chains get more 'cross-linked', it gets harder for them to move around, and your slime starts look like putty. You can experiment with adding more Borax solution to see if this indeed makes the slime thicker.
The trick to this experiment is knowing how much Borax to add. It you add too little, your slime will be too sticky due to the excess glue. If you add too much Borax there will be too much 'cross-linking' and it won't feel like slime.

WHAT YOU NEED

- 100mL 7% solution of PVA
- Food colouring
- 40mL Sodium tetraborate decahydrate solution (Borax)
- 4x 250 mL beakers
- 3x 50 mL measuring cylinders
- Glass stirring rod
- Teaspoon
- 4x Resealable plastic bag
- Paper towel
- 10ml Talcum powder (2x teaspoons)

Teachers notes:

- To make 100mL 7% solution of PVA add 7g of powdered or crystalline PVA (1 teaspoon=5g) to 100mL of water. Heat on hot plate with magnetic stirring for 2hrs or until solution dissolved.
- You can substitute PVA solution with PVA wood glue from your supermarket or craft shop. If using wood glue you will need to increase your concentration from 25ml to 40ml in each slime mixture.
- You can also substitute PVA solution with water soluble laundry bags available at http://www.solpak.com.au/ or http://www.biopak.com.au/ (use smallest size 66 x 84cm). Dissolve the bag in 920mL of hot water (>65°C)

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WHAT TO DO

Part 1: Prepare 3 different colour coded mixtures of slime

You can get students to work in groups of three.

Slime	Colour	PVA	Water	Borax solution
1	Green	25ml	15ml	10ml
2	Blue	25ml	30ml	10ml
3	Pink	25ml	0ml	10ml

1. Prepare three different solutions according to the table.
2. Measure PVA into a 250mL beaker
3. Add required amount of water and a couple of drops of the food colouring depending on slime number, mix together.
4. Add Borax solution to the PVA paste and stir. As you stir the slime should start to form.
5. Remove the "slime" from the beaker and knead for a couple of minutes.
6. Now it's time to compare your slime to the other's!

OBSERVATIONS

	1/Green	2/Blue	3/Pink
Description (texture & odour)			
Slow poke test (slowly poke your finger into the slime)			
Quick poke test (quickly poke your finger into the slime)			
Slow pull test (Slowly pull on a piece of slime)			
Quick pull test (Quickly pull on a piece of slime)			
Blob Test (Roll your slime into a ball & place in the palm of your hand). Does it keep its shape?			
Bounce test (roll slime into a ball & drop on the table) Does it bounce?			

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Part 2: Changing the properties of your slime using additives

Decide which slime has the best consistency 1, 2, or 3.

Make that number slime again adding 10ml (2x teaspoons) talcum powder to your PVA water solution before adding the borax.

OBSERVATIONS

Make the following observations about your slime and investigate changes with additives. Record your findings in the table below:

TEST	SLIME	Talcum powder
Description (colour, texture & odour)		
Slow poke test (slowly poke your finger into the slime)		
Quick poke test (quickly poke your finger into the slime)		
Slow pull test (Slowly pull on a piece of slime)		
Quick pull test (Quickly pull on a piece of slime)		
Blob Test (Roll your slime into a ball & place in the palm of your hand). Does it keep its shape?		
Bounce test (roll your slime into a ball and drop on the table) Does it bounce?		

When finished with your investigation and observations place the slime into a sealable plastic bag and it should keep for a while.

QUESTIONS

1. How did the additives in part 2 change the polymer?
2. What could your slime be used for?
3. Can you find another example where there is a crosslinking reaction to form a material with different properties from the starting materials?

CURRICULUM

Strand: Natural & Processed Materials

Core learning outcomes:

3.2, 4.3, 5.2

OTHER POLYMERS

Probably the most important polymers in your home is the money in your wallet. From 15 May 1996, all Australian banknotes were made of plastic. Australia's plastic banknotes are made from biaxally-oriented polypropylene, meaning the plastic has been stretched in both directions. When the plastic banknotes become unfit for use, they are recycled into a range of products including plastic polypropylene compost bins!