

# Mysterious Mixtures

## Science for 3–5 year-olds



**CAREGIVERS, PARENTS AND PRESCHOOL EDUCATORS** provide many creative opportunities for young children to explore their world. That's why we've created *Big Science for Little Hands*, an evolving suite of science resources for teachers and caregivers of 3–5-year-old children. Our aim is to develop activities that inspire further exploration and discovery. We hope that these resource materials complement what you are already doing and offer additional ideas to inspire further exploration.

The activities have been designed for experiential learning. The intent is for children to experience each concept, rather than simply talking about it. Each activity can serve as a starting point for further exploration.

The activities are divided into the following categories.

**Introductions**—These could be used to set the stage for the topic, or to find out how much the children already know. They're low-preparation, low-mess activities for a large group to do together.

**Explorations**—These require a bit more set-up and clean-up. They work best with small groups of children. They're intended to be open-ended, with a teacher or other adult available to pose questions and expand the activity as required.

**Make This**—These explorations result in a product that children can take home or display.

**All Together**—This big whole-group activity would make a great wrap-up to the topic.

**Connections**—Ideas for extending the topic in cross-curricular ways.

You know your group best! There is no perfect way to order or arrange these activities. They could be combined into a whole day on a theme, or taken one at a time over several weeks. Please pick and choose, expand or contract as makes sense for your group of children.



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Science World British Columbia  
TELUS World of Science 1455 Quebec Street, Vancouver, BC Canada V6A 3Z7  
t 604-443-7440 f 604-443-7430 w [telusworldofscience.com/vancouver](http://telusworldofscience.com/vancouver)

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### Topics Now Available:

#### Round the Circle

Activities to explore round things and things that roll.

#### Wet & Dry

Activities to explore being wet and dry.

#### Sticky Stuff

Activities to explore stuff that sticks.

#### Size Matters

Activities to explore things that get bigger and things that get smaller.

#### Mysterious Mixtures

Activities to explore dissolving, separating, mixing and combining.

... Check for more resource packages coming soon: [scienceworld.ca/preschool.html](http://scienceworld.ca/preschool.html)

# Mysterious Mixtures

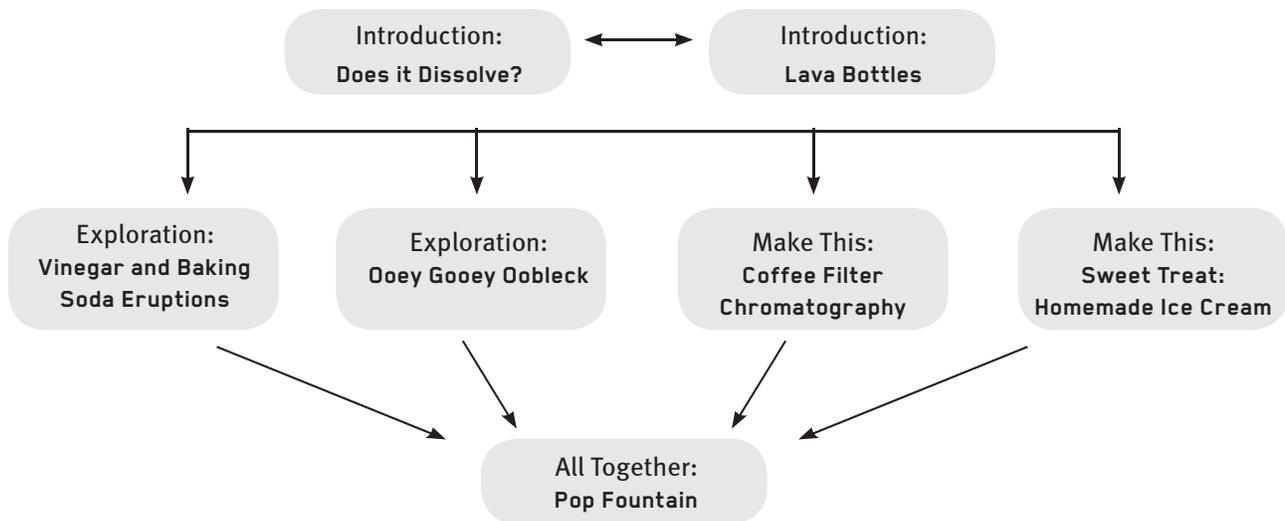


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## A Path Through *Mysterious Mixtures*

Here's one possible way to put the activities in this resource together.

- Do one or two *Introductions* at circle time in a large group.
- Have the children try the *Explorations* and *Make This* in smaller groups at stations around the room.
- Try *All Together* just before the end of the school day, or at the end of a few days on the topic.



*Big Science for Little Hands* supports the learning goals outlined in the British Columbia Early Learning Framework, particularly those in the area of Exploration and Creativity.

To promote exploration and creativity, adults provide an environment where young children can do the following:

- explore the world using their bodies and all their senses
- build, create and design using different materials and techniques
- actively explore, think and reason
- identify and try possible solutions to problems in meaningful contexts and situations
- be creative and expressive in various ways
- develop a sense of wonder for natural environments
- express a zest for living and learning

(BC Early Learning Framework: [bced.gov.bc.ca/early\\_learning/](http://bced.gov.bc.ca/early_learning/))

## Share with us!

Please send us your feedback, suggestions and ideas.

Email [bslh@scienceworld.ca](mailto:bslh@scienceworld.ca)

Or visit [scienceworld.ca/preschool.html](http://scienceworld.ca/preschool.html) and fill in an online survey.

*Thank you to the children and families around British Columbia who assisted with the testing of the activities in this package. Thank you to The Canadian Children's Book Centre who recommended many wonderful children's stories.*

# Mysterious Mixtures: Introductions



## Does it Dissolve?

What happens when we combine a liquid and a solid? When a solid dissolves, it seems to disappear, but it is still there, we just cannot see it.

Sugar breaks down into tiny pieces and dissolves in water. When the sugar is completely distributed throughout the water, we call this a solution. However, not everything dissolves. Rocks and sand do not dissolve in water—they sink to the bottom. We call this a mixture.

### What you need

- clear cups or other containers
- water
- sugar cubes
- spoons
- rock or gravel (similar size as sugar cube)

### Hands-on

1. Fill two clear cups or containers with warm water.
2. Make some predictions about what you think will happen when you add the sugar cube and the rock to the water.
3. Add one sugar cube to one cup and a rock to the other cup.
4. Observe.
5. Taste the sugar water to see if you can detect the sugar.

### Questions to ask

- What will happen to the sugar when we add it to the water?
- What will happen to the rock when we add it to the water?
- Where is the sugar now? Where is the rock now?
- Where did the sugar go? Can we get it back?

### What next?

Experiment with other substances in your kitchen (e.g. drink crystals, hard candies, pepper, sand, flour, salt). What dissolves (makes a solution) and what does not (makes a mixture)?

Compare how quickly a sugar cube dissolves when you stir it and when you let it sit still.

Compare how quickly a sugar cube dissolves in cold water and in warm water.

Try pouring a small amount of sugar water onto a coloured dish. Allow the water to evaporate away (this might take a while). Can you find any sugar?

Compare melting and dissolving. Melting is a change of state, dissolving is a solid being integrated into a liquid.

### Note for next time

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### Where to next?

#### INTRODUCTIONS

- ▶ *Does it Dissolve*
- Lava Bottles

#### EXPLORATIONS

- Vinegar and Baking Soda Eruptions
- Ooey Goey Oobleck

#### MAKE THIS

- Coffee Filter Chromatography
- Sweet Treat: Homemade Ice Cream

#### ALL TOGETHER

- Pop Fountain

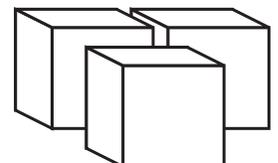
#### CONNECTIONS

- More Ideas



### Hint:

Using warm water will make the sugar dissolve faster.



# Mysterious Mixtures: Introductions



## Lava Bottles

Oil and water don't mix. They stay separate because of their molecular structure. Scientists call them immiscible liquids.

Oil is less dense (lighter for its size) than water, so it rises to the top. Salt is denser than both oil and water and sinks to the bottom. The salt drags some of the oil down as it sinks. The salt dissolves in the water and releases the oil, which rises back to the surface.

### What you need

- clear plastic water bottle with lid
- water
- vegetable oil
- food colouring
- salt
- spoon

### Hands-on

1. Pour water into the bottle until it is about one-third full.
2. Add about the same amount of vegetable oil to the bottle. Observe.
3. Add a few drops of food colouring. Observe.
4. Put the lid on tightly.
5. Shake the bottle vigorously. Observe.
6. Allow the bottle to sit undisturbed for a few minutes. Observe.
7. Add one spoonful of salt to the bottle. Observe.
8. Repeat step 7 as many times as you like.

### Questions to ask

What happened when you:

- \* Added the oil? Did it mix with the water?
- \* Added the food colouring? Is the food colouring in the oil or the water?
- \* Shook the bottle?
- \* Let the bottle sit after shaking?

What did you notice when you added the salt? Where did the salt go? What did the oil do?

### What next?

Add some dish soap to get the oil and water to mix. Soap is an emulsifier (a substance that can mix with both oil and water).

Make oil and vinegar salad dressing. Add garlic or a little bit of mustard to help the oil and vinegar to mix. Dip vegetables in for a healthy snack.

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### Where to next?

#### INTRODUCTIONS

Does it Dissolve

► *Lava Bottles*

#### EXPLORATIONS

Vinegar and  
Baking Soda Eruptions  
Ooey Goey Oobleck

#### MAKE THIS

Coffee Filter  
Chromatography  
Sweet Treat: Homemade  
Ice Cream

#### ALL TOGETHER

Pop Fountain

#### CONNECTIONS

More Ideas



### Hint:

Observe the bottle from the side, not from the top.



# Mysterious Mixtures: Explorations



## Vinegar and Baking Soda Eruptions

Vinegar is an acid and baking soda is a base. When you combine them, they foam, bubble and overflow their container. The acid and base are reacting when they do this, neutralizing each other and creating salt, water and bubbles of carbon dioxide gas.

### What you need

- tall narrow vase or similar container
- vinegar
- baking soda
- food colouring
- funnel
- spoon
- baking sheet, tray or pan

### Hands-on

1. Place the vase on the baking sheet.
2. Spoon some baking soda into the vase.
3. Add 2–3 drops of food colouring.
4. Pour in some vinegar.
5. Stand back and enjoy the reaction.
6. Repeat!

### Questions to ask

What do you think will happen when we mix the vinegar and baking soda?  
What did you see?  
Where did the bubbles come from?

### What next?

Try combining different amounts of baking soda and vinegar.  
Add a bit of dish soap for extra bubbles.  
Make a volcano shape from aluminum foil and do the reaction in its crater.  
Explore other things that fizz, such as Alka-Seltzer tablets.

### Note for next time

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### Where to next?

#### INTRODUCTIONS

Does it Dissolve  
Lava Bottles

#### EXPLORATIONS

► *Vinegar and Baking Soda Eruptions*  
Ooey Goey Oobleck

#### MAKE THIS

Coffee Filter  
Chromatography  
Sweet Treat: Homemade Ice Cream

#### ALL TOGETHER

Pop Fountain

#### CONNECTIONS

More Ideas



### Hint:

To make your vinegar usage more cost-effective, dilute it with water before you use it in this experiment.



# Mysterious Mixtures: Explorations



## Ooey Gooley Oobleck

Cornstarch and water make a fascinating mixture. For fun, we call it Oobleck.

The cornstarch is suspended in the water (instead of dissolving like sugar). Stirring it or squeezing it with force causes it to behave rather like a solid. When it's treated gently, it behaves more like a liquid.

What's happening? Applying a force to the Oobleck squeezes the water out from between the cornstarch bits. Pulling or pouring the Oobleck gently lets the water stay between the cornstarch bits.

Scientists call Oobleck a non-Newtonian fluid.

### What you need

- tray, cake pan or large bowl
- cornstarch
- water

### Hands-on

1. Combine equal parts water and cornstarch in the pan or bowl.
2. Get messy: stir, squeeze, pour, enjoy!

### Questions to ask

- How does the Oobleck feel?
- How long can you hold some in your hand?
- What happens when you squeeze it?
- What happens when you stir it quickly or slowly?

### What next?

- Try using spoons, sieves, spatulas and whisks in your Oobleck.
- Add more cornstarch or water to your mixture and observe how it changes.

### Note for next time

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### Where to next?

#### INTRODUCTIONS

- Does it Dissolve
- Lava Bottles

#### EXPLORATIONS

- Vinegar and Baking Soda Eruptions
- *Ooey Gooley Oobleck*

#### MAKE THIS

- Coffee Filter Chromatography
- Sweet Treat: Homemade Ice Cream

#### ALL TOGETHER

- Pop Fountain

#### CONNECTIONS

- More Ideas

### Hint:

Get Messy! Do this activity outside on a warm day or somewhere where mess is okay.

Dispose of Oobleck in the garbage, not down the sink.

For easy cleanup, allow spilled Oobleck to dry and then sweep up with a broom.



# Mysterious Mixtures: Make This



## Coffee Filter Chromatography

The opposite of mixing is separating. The inks in felt pens (particularly brown and black ones) are often mixtures of several basic dye colours. We can separate the dyes in felt pens by colouring with the pens on coffee filters and dripping water on the designs. Scientists call this method of colour separation chromatography.

### What you need

- water-based felt pens (Crayola, Mr. Sketch, etc.)
- white basket-style coffee filters
- water
- droppers

### Hands-on

1. Smooth out the folds in a coffee filter.
2. Draw dots or lines on the filter with felt pens.
3. Drip a small amount of water onto the marks you made.
4. Watch to see what happens.
5. Add more dots or lines and water as desired.

### Questions to ask

What colours do you think are hiding inside our black pen?  
What new colours do you see now that we have added the water?

### What next?

Turn your coffee filters into art by cutting or shaping them into butterfly wings.  
Experiment with separating by other methods. Try separating a mixture of sand, gravel, beads, etc. using sieves and strainers or sorting coins using a sorter.

### Note for next time

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### Where to next?

#### INTRODUCTIONS

- Does it Dissolve
- Lava Bottles

#### EXPLORATIONS

- Vinegar and Baking Soda Eruptions
- Ooey Goey Oobleck

#### MAKE THIS

- *Coffee Filter Chromatography*
- Sweet Treat: Homemade Ice Cream

#### ALL TOGETHER

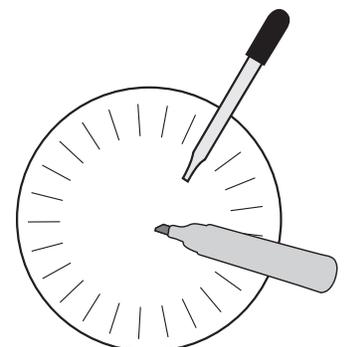
- Pop Fountain

#### CONNECTIONS

- More Ideas

### Hint:

Felt pens labelled as “washable” or “wipeable” give less spectacular results than other water-based felts.



# Mysterious Mixtures: Make This



SCIENCE  
WORLD  
BRITISH COLUMBIA

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## Sweet Treat: Homemade Ice Cream

Dissolve sugar in milk then cool it down to make a delicious treat.

Fresh water freezes at zero degrees Celsius, but milk needs to be colder than that to freeze into ice cream. How can we make it colder?

When we add salt to ice, it dissolves in the water on the surface of the ice cubes. Salty water freezes at a much lower temperature than fresh water. The salt and ice mixture gets much colder than zero degrees Celsius. The mixture also cools milk enough to make your yummy treat.

### What you need

(per 1/2 cup serving):

- 50 mL (1/4 cup) 2% milk
- 50 mL (1/4 cup) whipping cream
- 25 mL (5 tsp) sugar
- 0.5 mL (1/8 tsp) vanilla or vanilla flavouring
- 100-175 mL (1/2 cup) salt
- 500 mL (2 cups) ice cubes
- one 1 L (1 quart) zip-top bag
- one 4 L (1 gallon) zip-top bag
- spoon
- measuring cups/spoons

### Hands on

1. Measure the sugar, milk, whipping cream and vanilla into the smaller zip-top bag.
2. Seal the bag securely.
3. Put the ice cubes into the larger zip-top bag.
4. Add salt to the bag of ice.
5. Place the sealed smaller bag inside the larger bag of ice and salt.
6. Seal the larger bag securely.
7. Gently rock the large bag from side to side. Caution, cold!
8. Shake and rock the bag for 5-10 minutes or until the contents of the smaller bag have solidified into ice cream.
9. Remove the small bag, open it, grab a spoon and enjoy!

### Questions to ask

What happens to the sugar when we add it to the milk?

What happens to the salt when we add it to the ice?

What are we making?

How does your bag feel?

What does your mixture taste like?

### What next?

Experiment with making different ice cream flavours by adding chocolate, fruit or other flavourings.

### Where to next?

#### INTRODUCTIONS

Does it Dissolve  
Lava Bottles

#### EXPLORATIONS

Vinegar and  
Baking Soda Eruptions  
Ooey Gooley Oobleck

#### MAKE THIS

Coffee Filter  
Chromatography

► *Sweet Treat: Homemade Ice Cream*

#### ALL TOGETHER

Pop Fountain

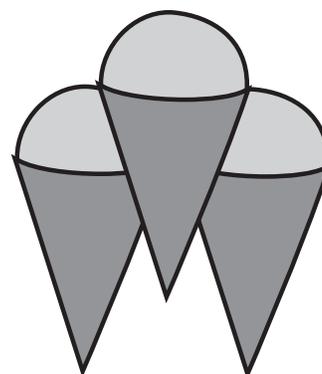
#### CONNECTIONS

More Ideas



### Hint:

It is best to hold the large bag by the top seal or to have gloves or a cloth between the bag and your hands.



# Mysterious Mixtures: All Together



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## Pop Fountain

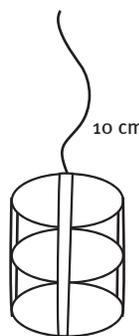
Use the “explosive” property of carbonated drinks to create a fountain of pop! Gum arabic on the Mentos’ surface breaks up the surface tension of the water in the pop, allowing the carbon dioxide gas to release in a big rush. Lots of the pop goes along for the ride and shoots high in the air.

### What you need

- 2L bottle of carbonated pop (diet cola works best)
- mint Mentos
- pop bottle lid with a 5mm diameter hole drilled
- string
- masking tape
- scissors

### Hands-on

1. Stick three Mentos together with loops of tape.
2. Hang the chain of Mentos from about 10 cm of string. (diagram here)
3. Go outside with the pop, drilled lid, strung Mentos and scissors.
4. Thread the long end of the string through the hole in the drilled lid.
5. Place the bottle on level ground. Take the lid off the 2L bottle of pop and screw the prepared one onto the bottle (keep holding the string). The Mentos should be suspended inside the neck of the bottle.
6. Make sure everyone is far back. Snip the string to release the Mentos. Step back quickly and enjoy!



### Where to next?

#### INTRODUCTIONS

- Does it Dissolve
- Lava Bottles

#### EXPLORATIONS

- Vinegar and
- Baking Soda Eruptions
- Ooey Goey Oobleck

#### MAKE THIS

- Coffee Filter
- Chromatography
- Sweet Treat: Homemade Ice Cream

#### ALL TOGETHER

- Pop Fountain

#### CONNECTIONS

- More Ideas

### Questions to ask

- What will happen when we put the Mentos in the pop?
- What made the pop shoot up in the air? How high did the pop go?

### What next?

Experiment with adding different amounts of Mentos or using different flavours of pop.

### Note for next time

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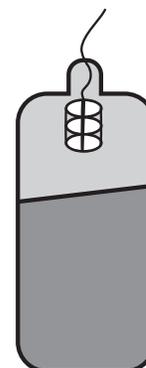
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### Hint:

The coke can spray anywhere from 2 to 9 metres high!

Diet pop is less sticky to clean up than regular pop.

Steve Spangler Science sells a “geyser tube” for dropping Mentos into pop: [stevespanglerscience.com](http://stevespanglerscience.com)



# Mysterious Mixtures: Connections



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## More Ideas

### Mixture Songs, Rhymes and Circle Games

- Pat-a-cake
- Purple Stew
- Make Cookies
- Betty Batter

### Mixture Snacks

- Pancakes, cakes, muffins, cookies or other baked treats
- Layered gelatin (e.g. Dr. Oetker Trio Treat)

### Children's books about mixtures

*Hannah's Collections* by Marthe Jocelyn 🍁

*Purple, Green and Yellow* by Robert Munsch 🍁

*Art's Supplies* by Chris Tougas 🍁

*Bartholomew and the Oobleck* by Dr. Seuss

### Resources for teachers

*123 I Can Paint!* by Irene Luxbacher 🍁

*Science Play! Beginning Discoveries for 2-6 year-olds* by Jill Frankel Hauser

*Kids Cooking: A Very Slightly Messy Manual* by \*Klutz Editors

*Sesame Street C is for Cooking: Recipes from the Street* by Susan McQuillan

### Where to next?

#### INTRODUCTIONS

Does it Dissolve  
Lava Bottles

#### EXPLORATIONS

Vinegar and  
Baking Soda Eruptions  
Ooey Gooey Oobleck

#### MAKE THIS

Coffee Filter  
Chromatography  
Sweet Treat: Homemade  
Ice Creamy

#### ALL TOGETHER

Pop Fountain

#### CONNECTIONS

▶ *More Ideas*

