

# Investigate Geysers



## Learning outcomes

Students will:

- ✓ observe gas escaping from a liquid, using sight and sound
- ✓ observe dissolving
- ✓ discuss what makes the gas escape from the liquid
- ✓ discuss reversible and irreversible changes

In episode eight, *Selenia Escaping from Dinosaurs*, Selenia uses the energy of a geyser to make a wormhole.

Selenia had never seen a geyser before and wants to show her friends what they look like.

Can your students investigate how to create the best geyser?

You might like to start this investigation by considering what constitutes the 'best' geyser, for example, height, duration, noise, spread of liquid and how you would measure these characteristics.

# Curriculum Links

## Sc 1 Scientific enquiry

- Ideas and evidence in science
- Planning
- Considering evidence and evaluating

## Sc3 Materials and their properties

- Grouping and classifying materials, specifically gases and liquids
- Changing materials, specifically dissolving and reversible changes

# Science background

In this experiment students will observe what happens when a sweet or other solid is added to a fizzy drink. Students should understand the importance of careful observation, in this case looking for the small bubbles that form on the sweet.

Fizzy drinks contain a gas, carbon dioxide. This gas is forced into the drink under pressure during the bottling process. When you take the lid of the bottle, the gas slowly escapes. This is what makes the drink fizz.

The sweet speeds up this process by helping the gas form bubbles in the drink. This process works best with a sweet that has a rough surface, such as Love Hearts. The rough surface provides places (nucleation sites) for the gas bubbles to form. A sweet with a smooth or waxy surface does not have as many places for bubbles to form, so does not create as violent a geyser.

Since the sweet sinks to the bottom of the container, the gas bubbles must rise through the liquid. If there is enough gas trying to escape, it forces some of the liquid (the drink) out of the bottle.

This build up of pressure is similar to what happens when a geyser goes off. In the case of a geyser, heat from molten rock (magma) radiates into the surrounding rock. As water percolates underground, it is heated by this hot rock. The hot water begins to rise back to the surface through fractures in the rock. If there are constrictions in these fractures, then the pressure mounts causing the hot water to become superheated. The pressure then drops and the water rapidly turns into steam. This vents in the form of a geyser.

More information about geysers is available at <http://geology.com/articles/geyser.shtml>.

## What do I do?

This demonstration should be done OUTSIDE with the class observing and recording what is happening.

Unscrew the bottle lid and drop the test sweet in the top. Stand back!

Bubbles should form on the sweet. As these become more violent, the geyser should 'go off', emitting a fountain of soft drink.

# Extension ideas

Can you use other materials to set off the geyser (e.g. different types of sweets, raisins, sand)?

What happens if you use more than one sweet to start the geyser off?

Does the sweet dissolve during the process? If it does, can you keep the geyser going by adding more sweets? (At some point, the gas in the soft drink will be used up so the geyser will stop working. Whether this happens after one or more sweets depends in part on the volume of drink used.)

Have students measure how long the geyser goes for or how high it gets.

Discuss with your class whether the reaction is reversible or not? If you could add pressurised gas to the drink, you could make it fizzy again. This is how the drink was made in the first place. However, once the gas and much of the liquid have escaped from the bottle, you won't be able to get them back in. You'd have to use new pressurised gas to make any left over drink fizzy again.

# Equipment

You will need:

- ✓ Bottles of soft drink (enough for the number of solids you plan to test). You can do this experiment with big, 2 l bottles. These make a big geyser. Or you can use smaller, 300 ml bottles for a less messy example.
- ✓ Sweets and other solids to test

# SLG Card Game

The statements on the cards below could be used to describe some types of solids, liquids or gases. Ask your students to match the statements to the types of materials.



Holds its shape



Expands to fill the volume of the container



Maintains the same volume



Takes on the shape of the container



Air



Moves if you tilt the bottle it's in



Could be bent



GAS



SOLID



LIQUID

# Investigate Geysers



Wow! That geyser was really neat. We don't have them on my planet.



I'd like to show my friends water spurting out like that. Can you help me make a geyser using a fizzy drink and sweet?