



## Sherbert

### Key words and phrases:

Chemistry, Acids, Carbonate, Vinegar, Citric acid, Carbon Dioxide

### Brief Introduction

The fizzing on your tongue is caused by a chemical reaction between the citric acid and the sodium bicarbonate. When the citric acid and sodium bicarbonate touch your saliva, they react together to make bubbles that fizz and pop in your mouth. The icing sugar and lollipop make the nice taste.

This reaction is similar to the more common reaction between vinegar and sodium bicarbonate. When an acid (like vinegar or citric acid) is mixed with a carbonate (like sodium bicarbonate), they react to form carbon dioxide gas, water and a salt. The carbon dioxide produced in this reaction is what makes the bubbles on your tongue.

From: <https://www.questacon.edu.au>

## Curriculum links

Stage	Year	Australian Curriculum	NSW	VIC
Stage 4	Year 7			
	Year 8			
Stage 5	Year 9	<a href="#">ACSSU179</a>	<a href="#">CW3</a>	<a href="#">VCSSU125</a>
	Year 10			
Stage 6	Years 11/12			

Stage	Year	Australian Curriculum	NSW	VIC
Stage 4	Year 7			
	Year 8			
Stage 5	Year 9	Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer	Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed.	Different types of chemical reactions are used to produce a range of products and can occur at different rates; chemical reactions may be represented by balanced chemical equations.
	Year 10			
Stage 6	Years 11/12			

## Stage 4

### Discussion

In this activity students are encouraged to plan their own experiment and compare measurements that can be made using a mixtures

Students may find there are many ways to conduct this experiment - it about opening the field so that they may come up with their own research question. During the course of the experiment, students may:

- Make measurements
- Design experiments

### Science inquiry questions

- What variables can you change?
- What other observations can you make about the investigation?
- What other questions could you ask with this investigation?
- How could you improve this investigation to get better results?

Make some predictions about what will happen before you observe. Make some observations and write them down. Try and explain your observations and how the observations are connected. Remember, a prediction in science is a testable hypothesis. You must make a statement about what you think will happen, that can be tested.

Predict	Observe	Explain

## Stage 5

### Discussion

Students in Stage 5 may begin to question what effects the investigation of the with respect to variables. Students will be asked to list variables that can be controlled or changed etc. The student should list the variables that are to do with the experiment, as well as the observations of the data.

## Science inquiry questions

	Control variable	Independent variable	Dependant variable
Variable			
Observations			

- Determine if there is a relationship between different variables in this investigation
- What other questions could you ask with this investigation?
- How could you improve this investigation to get better results

## Stage 6

### Discussion

In this activity students move beyond the observation of electricity and materials to more complex analysis of how all these fields work together in real life examples.

Student in stage 6 will be asked to understand the application of chemistry and industry.

## Science inquiry questions

- Rank each risk in terms of likelihood and impact and make a judgement about whether the experiment is safe or not.
- What other questions could you ask with this investigation?
- How could you improve this investigation to get better results

		Impact				
		Very Low	Low	Medium	High	Very High
		1	2	4	8	16
Probability	Very High	5	10	20	40	80
	High	4	8	16	32	64
	Medium	3	6	12	24	48
	Low	2	4	8	16	32
	Very Low	1	2	4	8	16

	Risk	Consequence	Precaution

<b>Investigation</b>			
<b>Industry</b>			

## The experiment:

Are you having a spoon full of sugar and still not getting enough of a thrill? Never fear! This clever science trick will have you dancing on the roof tops.

### WHAT YOU NEED

- Icing sugar
- Sodium bicarbonate (baking soda)
- Powdered citric acid (from the health food section in your supermarket)
- Lollipop
- Plastic cup
- Teaspoon
- Tablespoon

### WHAT TO DO

1. Add one tablespoon of icing sugar to the plastic cup.
2. Add one teaspoon of bicarbonate of soda to the plastic cup.
3. Add one teaspoon of citric acid to the plastic cup.
4. Stir thoroughly.
5. Lick your lollipop, dip it in your mixture, and lick it again.
6. Feel what's happening on your tongue.
7. Repeat steps five and six.

### WHAT'S HAPPENING?

The fizzing on your tongue is caused by a chemical reaction between the citric acid and the sodium bicarbonate. When the citric acid and sodium bicarbonate touch your saliva, they react together to make bubbles that fizz and pop in your mouth. The icing sugar and lollipop make the nice taste.

This reaction is similar to the more common reaction between vinegar and sodium bicarbonate. When an acid (like vinegar or citric acid) is mixed with a carbonate (like sodium bicarbonate), they react to form carbon dioxide gas, water and a salt. The carbon dioxide produced in this reaction is what makes the bubbles on your tongue.

Reactions between citric acid and sodium bicarbonate take a very, very long time if both chemicals are in the form of a solid powder. If they are dissolved in water however, the reaction will go significantly faster.

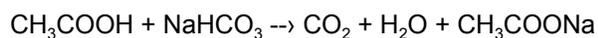
That is why no bubbles of carbon dioxide are formed until you wet the chemicals with your saliva. Household vinegar has a lot of water in it already, so reactions with vinegar and sodium bicarbonate happen very quickly and don't require additional water.

We can write the acid/carbonate reaction as a chemical equation:

Acid + Carbonate  $\rightarrow$  Carbon Dioxide + Water + Salt

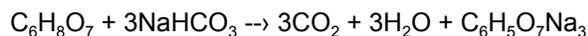
For vinegar and sodium bicarbonate, the chemical equation is:

Vinegar + Sodium Bicarbonate  $\rightarrow$  Carbon Dioxide + Water + Sodium Acetate



For citric acid and sodium bicarbonate, the chemical reaction reads:

Citric Acid + Sodium Bicarbonate  $\rightarrow$  Carbon Dioxide + Water + Sodium Citrate



### **INVESTIGATE!**

Try adding different amounts of each ingredient to see if you can make the mixture more or less fizzy. Be careful not to add too much citric acid, or your sherbet will taste very sour.

You could also try adding your sherbet to different sweet recipes (like cookies, cakes or ice cream). See if you can keep it from fizzing until the sherbet is in your mouth!

### **DID YOU KNOW?**

The break down of citric acid into carbon dioxide is happening right now inside your body (whether you've just had some sherbet or not). It is part of a very important biological process called the tricarboxylic acid cycle (TCA cycle) or the Krebs cycle, which is vital for helping turn the fuel in our bodies into energy.

From:

<https://www.questacon.edu.au/outreach/programs/science-circus/activities/fizzy-sherbet>