

Reacting Sherbet

Years 8 & 9

Overview:

Note: Complete the *Red Cabbage pH Indicator* experiment before this one.

Do you remember what you learned about acids, bases and pH from the previous experiment, *Red Cabbage pH Indicator*? If needed, quickly review the overview for that experiment and your results and notes. In this experiment, you'll create sherbet to observe an example of an acid-base reaction. Generally, during an acid-base reaction, the acid with a high concentration of hydrogen (H^+) ions and the base with a low concentration of (H^+) ions will neutralise or balance each other out. The product of this type of reaction will be a salt (not necessarily the same as the salt you put on food) and some other by-products.

Thinking back to the previous experiment, you identified some household items as acids and others as bases. In the instance of any that are edible (e.g. vinegar and lemon juice) think about your past experiences with tasting them. What do acids have in common in terms of taste? Bases or alkaline substances often have a familiar texture – when in water, they're quite slippery. Reflect on what any of the bases identified in the previous experiment are like to touch (e.g. liquid soap and egg white).

To make sherbet, you will use four ingredients. One is an acid, one is a base and the other two are just for flavour. You will do some preliminary tests with each ingredient to formulate an understanding of which ingredients are the acid and base.

Core alignment to Australian Curriculum:

Year 8

Chemical sciences

- Chemical change involves substances reacting to form new substances

Year 9

Chemical sciences

- Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer

Safety:

- The sherbet made in this experiment is edible provided no one eating it has any allergies, sensitivities or intolerances to any of the ingredients. Parents/guardians, please check whether any materials are known to cause allergies, intolerances or sensitivities in your child (via either ingestion or skin contact) before proceeding. Gloves can be worn for duration of experiment to reduce chances of skin contact with any ingredients if you're happy for your child to proceed.
- **Note:** most jelly crystals are not suitable for vegetarians and vegans
- The red cabbage pH indicator used in this experiment is not to be eaten.
- Use only food safe containers and utensils in this experiment.
- Thoroughly wash hands before and after activity.

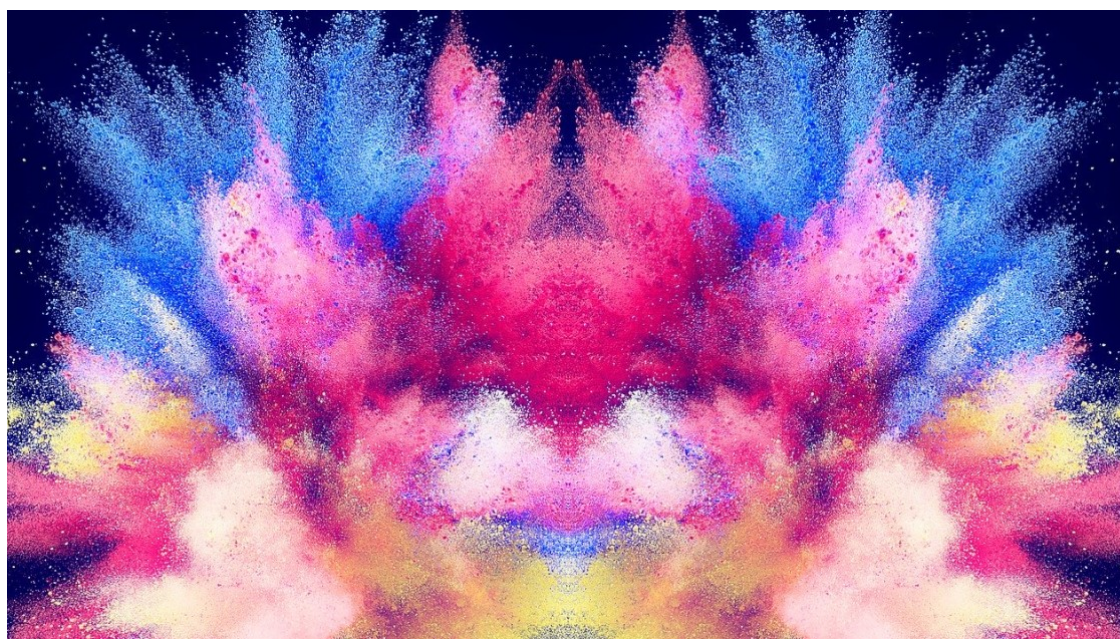


Materials:

- 4 x small containers/dishes
- 5 x teaspoons
- 1 x tablespoon
- Red cabbage pH indicator (from previous experiment) - not to be eaten
- Small mixing bowl
- Airtight container

Sherbet ingredients

- Jelly crystals (any flavour you like)
- Baking soda (sodium bicarbonate/bicarb soda)
- Icing sugar
- Citric acid



Procedure:

1. Copy the following results table onto some paper.



Test	Baking soda	Jelly Crystals	Citric Acid	Icing Sugar
Taste				
Colour and pH				
Sherbet taste test observations				

Results Table:

2. Beneath your table, Record a prediction about which sherbet ingredient is the acid, which is the base and which two are the flavour enhancers. Include reasoning for your predictions.
3. Taste-testing each ingredient separately: using a different spoon each time (to avoid contaminating the ingredients in their packets), collect a small amount (just enough to cover the tip of the teaspoon) of each ingredient and taste it on its own (drink some water between each to refresh your taste buds). Record a description for the taste of each ingredient in your table.
4. Add a small quantity (e.g. $\frac{1}{4}$ of a teaspoon) of each sherbet ingredient into four small containers (one ingredient per container). Make sure you label which container holds which sherbet ingredient. Add a drop or two of water to each container to help each sherbet ingredient partially dissolve.
5. Add a drop or two of your red cabbage pH indicator to each of the 4 containers with the sherbet ingredients.
6. Record what the colour change is for each ingredient and use the following diagram, as best as possible, record the pH of each ingredient.
7. Wash, dry and pack away all equipment used so far (leave sherbet ingredients out). Dispose of any leftover red cabbage indicator down the sink.



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Making Sherbet:

8. Wash your hands thoroughly.
9. In a mixing bowl, add 2 tablespoons of icing sugar, 3 tablespoons of jelly crystals, 1 teaspoon of citric acid and 1 teaspoon of baking soda.
10. Mix well.
11. Taste your sherbet with a clean spoon.
12. Record observations from your taste test of the sherbet in your results table. Take note of any unusual sensations. What is the overall taste?
13. Enjoy some sherbet and when you've had enough, pack the rest into a labelled ("sherbet") airtight container and store in your pantry.
14. Pack away all ingredients and wash, dry and put away all equipment. Wipe down your workspace.
15. Wash your hands thoroughly.



Reflection:

Underneath your results table (or on a fresh piece of paper), record your answers to the following.

- Which sherbet ingredients were the main acid and base involved in the reaction? Use your test results to provide reasoning for your answer.
- Were either of the other two ingredients also acidic or basic?
- Once you'd combined all the ingredients to make the sherbet, could you still taste all the individual ingredients' flavours or did the overall taste change?
- Did you notice any unusual sensation in your mouth once the sherbet hit your tongue? In addition to a salt produced in this acid-base reaction, what else do you suspect was produced?
A _____.
- Why do you think the ingredients only reacted once they were in your mouth?

