LESSON PLAN

Investigating pH and soft drinks

Overview

Food and drinks have a shelf life. After this shelf life they may not be nice to eat – labelled 'Best Before' - or be dangerous to consume – labelled 'Use By'. In this lesson students will use scientific terms to describe variables as they investigate the impact of changing the pH on the growth of yeast in soft drinks.

National Curriculum links

KS3 Working Scientifically: Experimental Skills and Observations

- ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
- make predictions using scientific knowledge and understanding
- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety

KS3 Working Scientifically: Analysis and Evaluation

- present observations and data using appropriate methods, including tables and graphs
- Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions

KS3 Biology: Cells and Organisation

- the structural adaptations of some unicellular organisms

KS3 Chemistry: Chemical reactions

- the pH scale for measuring acidity/alkalinity; and indicators

Starters

What is the connection (5 minutes) – Look at the images and try to determine the connection by encouraging students to discuss with their peers. Then take their ideas through question and answer until they realise that all the images are of yeast.

Show-me boards (10 minutes) – Give each student an A4 dry-wipe board, pen and eraser. Ask students to draw a typical animal cell and label the parts. Give instant feedback to the students as they show their work. Weaker students can be encouraged to look at other people's answers before attempting their own. Then ask students to answer the following questions showing their response immediately: which part of the cell controls the chemicals that can come into and out of the cell? (cell membrane). What does the nucleus do? (controls the cell). Extend students by asking them where respiration occurs. This happens in every living cell in a structure called mitochondria found in the cytoplasm.

Main

Introduce the terminology that the students can use to complete the practical. If an interactive whiteboard is available, the virtual pens could be used to draw links between the keywords and their definition.

Explain to students that food and drink can spoil. This can happen because of microbes like yeast. To reduce the growth of microbes food scientists pasteurise food and drinks that are designed to be stored chilled. Alternatively, natural chemicals can be added to fruit juice to reduce the growth of microbes such as yeast and increase the shelf life of the fruit juice.

Encourage students to complete the investigation. While students are waiting for the limewater to turn cloudy, encourage them to answer the questions. You could extend students and ask them to consider why citric acid and baking powder were used to change the pH rather than acids than chemicals you might be more used to using in the laboratory e.g. hydrochloric acid and sodium hydroxide.

Plenary

Pitch (10 minutes) –Ask students to work in groups and imagine that they are pitching to Alan Sugar. They have got to suggest how he could improve the shelf life of his new grape fruit drink. Encourage each team to give their 30 second pitch to the class.

Reflection (5 minutes) – Ask students to think about one new thing they have learnt today and one thing that they have revised today. Then share with the neighbour, and finally with their table. Ask each table to report back the most important fact or skill that has been learnt and revised from the lesson. Relate this back to the lesson objectives.