

**LESSON
PLAN**

Investigating the atmosphere for lettuce pinking

Overview

Cut iceberg lettuce in particular can oxidise and this causes a pink discolouration of the leaf. Modifying the gases in the packaging of cut lettuce can increase the shelf life and reduce waste. In this lesson students will re-cap the simple laboratory gas tests for hydrogen, carbon dioxide and oxygen and then use them to identify samples of gases. Students then investigate the rate of pinking of cut iceberg lettuce in the different gases.

National Curriculum links

KS3/4 Working Scientifically: Analysis and Evaluation

- interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions

KS3 Chemistry: Chemical reactions

- presenting chemical reactions using formula and equations

KS4 Working Scientifically: Analysis and Evaluation

- presenting reasoned explanations, including relating data to hypothesis

KS4 Chemistry: Chemical changes

- identification of common gases

KS4 Chemistry: Rate and extent of Chemical change

- Factors that influence the rate of reaction

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 all examples of oxidation reactions.

Hydrogen balloon (10 minutes) – Demonstrate an explosion of a hydrogen balloon. Then use question and answer to build up the word equation for the reaction. Give students molecular model kits and ask them to make molecules of hydrogen, oxygen and water and ensure there is the same number and type of atom on both sides of the equation. Students can then write the balanced symbol equation. Explain that this is an example of a chemical reaction and in particular a combustion and oxidation reaction.

Main

Use question and answer to ensure that students can recall the simple laboratory tests for the common gases. You may wish to play the video clip or demonstrate them. Ask students to use these tests to identify the sample of gases they have been given.

Show students a sample of iceberg lettuce that has undergone pinking. This is usually most easily visible where the stem of the crop has been cut. Explain that this is another example of an oxidation reaction. If this reaction could be slowed down then the shelf life of the lettuce could be improved and waste reduced. Encourage students to suggest how to slow chemical reactions (cool them) and link this to how lettuce is stored (in the fridge).

Encourage students to complete the investigation and determine which atmosphere affects the rate of pinking. You may wish to get a selection of prepared salads and look at the packaging to determine any special packaging such as protective atmospheres. If possible, leave the lettuce for a few days and take a photograph twice a day to see how they visibly change.

Plenary

Reflection (10 minutes) – Ask students to summarise their learning outcomes. This can be supported by providing prompts.

5,4,3,2,1 (5 minutes) – Ask students to list five chemical reactions, four oxidation reactions, three oxidation reactions which spoil food, two ways to indicate carbon dioxide being present, and the formula for oxygen gas.