

Materials Testing: Plastics: Overview

Summary

Plastics are everywhere. They have an extraordinary range of uses, from soft drink bottles and packaging to car panels and building materials. The plastic that is used for an object has been selected because of its properties including its strength, its flexibility, its durability and its cost.

Supermarket bags are extremely convenient but also environmentally damaging. Researchers and industry continue to search for cost-effective environmentally friendly biodegradable plastics. To replace traditional supermarket bags, the new bioplastics must be as strong and resilient as the plastics used currently. Just how strong will these new plastics need to be to match the plastics used in the current supermarket bags? Are the biodegradable and recyclable bags being used as good as the traditional bags?



Not only are items purchased from the supermarket heavy requiring supermarket bags to be strong but they also often come in packages with sharp edges and corners. Bags may be punctured or cut and eventually tear.

In Part 1, students will work out just how strong the plastic is in different supermarket bags. The principles in the testing procedure you will use are the same as those used by materials scientists in their labs.

In Part 2, students will use the materials and their own improved version of the suggested testing technique provided to compare the resistance of the bags to puncturing.

Curriculum Outcomes: Australian Curriculum F-10

Years 5 and 6

Science as a human endeavour

- Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083) (ACSHE100)

Years 7 and 8

Science as a human endeavour

- People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121) (ACSHE136)

Science Understanding: Chemical sciences

- Properties of the different states of matter can be explained in terms of the motion and arrangement of particles (ACSSU151)

Curriculum Outcomes: Australian Curriculum Technologies F-10

Years 5 and 6

Design Technologies

- Explore the characteristics and properties of materials and components that are used to produce designed solutions (ACTDEK004)

Curriculum Outcomes: Victorian Curriculum F-10

Levels 5 and 6

Science as a human endeavour

- Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people's lives (VCSSU073)

Science Understanding: Chemical sciences

- Solids, liquids and gases behave in different ways and have observable properties that help to classify them (VCSSU076)

Levels 7 and 8

Science as a human endeavour

- Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across the disciplines and practice of science (VCSSU089)
- Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (VCSSU090)

Science Understanding: Chemical sciences

- The properties of the different states of matter can be explained in terms of the motion and arrangement of particles (VCSSU096)
 - modelling the arrangement of particles in solids, liquids and gases

Science Understanding: Physical sciences

- Change to an object's motion is caused by unbalanced forces acting on the object; Earth's gravity pulls objects towards the centre of Earth (VCSSU103)
 - investigating the effects of applying different forces to familiar objects.

Curriculum Outcomes: Victorian Curriculum Technologies F-10

Design and Technologies: Technologies Contexts

- **Engineering principles and systems.** Analyse how motion, force and energy are used to manipulate and control electromechanical systems when designing simple, engineered solutions (VCDSTC045)
- **Materials and technologies specialisation.** Analyse ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment (VCDSTC048)

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