# Making plastic from potato starch

From: rsc.li/3XDyQTR

## Contents



ROYAL SOCIETY OF CHEMISTRY

# Background information

The supporting resources (presentation and teaching notes) will support members and outreach providers with the chemistry knowledge required to make a bioplastic from potato starch.

The speaker notes on the presentation slides will act as a guide for you to understand the premise of this work and the background chemistry that has gone into preparing it. When delivering the presentation to learners, it is important to consider the different levels of scientific understanding they will have based on the stage of their education. Some of the information provided in the notes will not be suitable for all learners.

For example:

- Discussion of naphtha compounds and aromatics is not common until post-16 education.
- The terms: monomer, polymer, alkane and alkene are not likely to have been met by learners until their 14–16 courses.
- Primary learners will know the concept of recycling but are more likely to talk about the physical properties of plastics rather than the chemical structure.

The following pages highlight some curriculum links across the nations related to the topics of materials (plastics), recycling and sustainability and will guide you as to the most appropriate language to use when talking about bioplastics with young people.

# England

## Primary (KS1 and KS2)

- Describe the simple physical properties of a variety of everyday materials.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

## Secondary (KS3 and KS4)

- Properties of ceramics, polymers and composites (qualitative).
- Earth as a source of limited resources and the efficacy of recycling.
- Bulk properties of materials related to bonding and intermolecular forces.
- Life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life.

## Post-16

- Intermolecular bonding: the relative strengths of different types of intermolecular bonding (including hydrogen bonding) and their effect on bulk properties.
- Polymerisation: addition polymerisation and condensation polymerisation, uses of polymers.

# Wales

## Primary (progression steps 1–2)

Being curious and searching for answers is essential to understanding and predicting phenomena.

- I can observe and describe ways in which materials change when they are mixed together.

Matter and the way it behaves defines our universe and shapes our lives.

- I can explore the properties of materials and choose different materials for a particular use.
- I can explore and describe the properties of materials and justify their uses.
- I can observe and describe ways in which materials change when they are mixed together.

## Secondary (progression steps 3–5)

Being curious and searching for answers is essential to understanding and predicting phenomena.

- I can understand how my actions and the actions of others impact on the environment and living things.
- I can evaluate contemporary issues that affect the planet and biodiversity.

Matter and the way it behaves defines our universe and shapes our lives.

- I can recognise that our planet provides natural materials and can explain why they may have been processed to make them useful.
- I can describe and explain the properties of different types of matter and relate these to how they are used.

# Scotland

## Primary

Materials: properties and uses of substances.

- Through exploring properties and sources of materials, I can choose appropriate materials to solve practical challenges (SCN 1–15a).
- By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed (SCN 2–15a).

## Secondary

### *BGE*

- I have carried out research into novel materials and can begin to explain the scientific basis of their properties and discuss the possible impacts they may have on society (SCN 4–16a).

### *National 5*

- Plastics are examples of materials known as polymers. Polymers are long chain molecules formed by joining together a large number of small molecules called monomers.

### *Highers*

- Candidates gain an understanding of chemical bonding and intermolecular forces that allows them to predict the physical properties of materials.
- Industrial processes are designed to maximise profit and minimise the impact on the environment which includes designing products which will biodegrade if appropriate.

# Northern Ireland

## Primary

- The effects of positive and negative changes globally and how we contribute to some of these changes.

## Post-primary

- Structures, properties and uses of materials.
- Describe how monomers can join together to form very long chain molecules called polymers.
- Pursue design solutions using environmentally friendly materials and energy sources.
- Demonstrate practical skills in the safe use of a range of tools, machines and equipment.

# Republic of Ireland

## Primary

- Identify and investigate a range of common materials in the immediate environment (including plastics).
- Come to appreciate the need to conserve resources (recycling).

## Junior Cycle

- Has the awareness, knowledge, skills, values and motivation to live sustainably.
- Need to understand science related challenges, such as environmental sustainability and the development of new materials and sources of energy.
- Focus on the concept of meeting the needs of the present without compromising the ability of future generations to meet their needs.
- Evaluate how humans contribute to sustainability through the extraction, use, disposal and recycling of materials.

## Senior Cycle

- Awareness of the contributions of chemistry to society e.g. alternative materials such as plastics.