Teaching ideas – complete

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rsc.li/EiC417-medical-plastics

This experiment accompanies the above article 'Body, heal thyself'.

In your class

Polymers make up a core part of the chemistry curriculum for 14–16 year olds. There are already lots of interesting examples to work with in class, like hydrogels and smart polymers. This article adds an excellent cross-curricular stimulus for discussion of issues from polymer synthesis through to properties and disposal.

Download this article and all the teaching resources, worksheets and experiments from the Education in Chemistry *website:* rsc.li/EiC417-medical-plastics

Testing the strength of natural polymers

(Experiment/demonstration, ages 11–16)

There is a common misconception among students that synthetic materials are superior to natural ones. A useful demonstration or whole class experiment to help address this myth is strength-testing hair and comparing the results with synthetic hair from wigs or extensions. When done as a class practical this generates some good data and presents a nice opportunity to revisit ideas about data types. Pupils find this activity very engaging, especially when they can get hair samples from their friends or family.

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Investigating what happens when polymers biodegrade

Science club investigation, ages 11–14

This investigation takes a number of weeks to achieve noticeable results so would be particularly suitable for a science club. Samples of polymers, ideally collected by pupils, are photographed and buried in soil. It is good to contrast known biodegradable polymers with traditional polyalkenes like those found in plastic bags. Pupils can decide the control for soil type (eg pH or humus content), watering frequency and depth of sample. Students dig up the samples at the time intervals they decide, photograph them and compare with the original photographs.

A nice extension to this is to book a Spectroscopy in a Suitcase visit (rsc.li/sias) and use infrared spectroscopy to monitor the changes.

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Reading for understanding

DART comprehension exercise, ages 11–16

Literacy is particularly important for success in all examinations and for wider success in school and the workplace. Reading scientific articles can be very challenging for pupils and it is useful to scaffold their reading with questions to help their comprehension. This exercise uses focused questioning to help students develop understanding of the key ideas in the article.

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Working with multiple representations

Worksheet, ages 14–16

As pupils move through the chemistry curriculum they need to become more comfortable with the different representations we use for substances. Being able to switch between chemical formulae, names and diagrams with ease will support their understanding of new chemistry.

In this exercise pupils use prior knowledge and reference materials (eg the internet) to match the visual representation with the names of substances mentioned in the article and use the article to add further information about substances.

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Investigating the properties of poly(caprolactone)

Experiment, ages 11–16

In this experiment pupils test the bounce of the polymer used by Julian's team. The experiment is simple and gives excellent results for discussion. Poly(caprolactone) can be bought relatively cheaply in the form of instamorph/polymorph used in crafting, and it is infinitely reusable. You may already have some in a 'smart materials' kit.

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Colorimetric determination of phosphate in toothpaste

Experiment, ages 16–18

This article discusses the use of bioglass as a source of calcium and phosphate ions for remineralising bones. It also states that remineralising toothpastes work in a similar way. The amount of phosphate ion in toothpaste can be determined using a phosphate assay technique combined with colorimetry or visual comparison. This provides a novel and engaging context for colorimetry work, especially if pupils are allowed to bring in toothpaste samples from home and compare their results with the manufacturers' published values.

[Web only] Phosphate ions react with ammonium molybdate to form a vivid blue complex, which gives good results in a school colorimeter at 650 nm. The reaction is carried out in the presence of excess acid to prevent oxidation. Download the student worksheet, technician notes and sample data *from the* Education in Chemistry *website:* rsc.li/EiC417-medical-plastics

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Will you use this article and resources with your students? What would make it more useful to you in the classroom? Let us know: eic@rsc.org

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