3. SUSTAINABLE MATERIALS: HOW MUCH SHAMPOO SHOULD WE USE?

1–1.5 HOURS

Children discuss the importance of using just the right amount of shampoo; as not enough will not wash the hair effectively but too much is a waste of shampoo. They investigate how much shampoo is the 'best' amount.

TYPE OF ENQUIRY

Carrying out fair and comparative test

OBJECTIVES

Compare everyday materials on the basis of their properties including their solubility (Y5 materials)

Know that some materials will dissolve in liquid to form solution (Y5 materials)

Build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials (Y5 non statutory guidance)

Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate (UKS2 Working Scientifically)

Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary (UKS2 Working Scientifically)

SCIENCE VOCABULARY

Foam, volume, liquids, strength, ratio, waste, dissolve

RESOURCES

per group of 4, unless otherwise stated

- Access to water
- 3 empty plastic 500ml pop bottles
- Syringe or pipette (ideally to measure to the nearest 1ml)
- 500ml measuring jug
- 20ml shampoo
- Permanent marker pen
- **Presentation: How much shampoo?**

Optional

- **Activity sheet 4**

SAFETY GUIDANCE

Shampoo is safe for home use so is low risk. However, in the unlikely event that a child gets some in their eye, rinse their eyes with plenty of clean tepid water.

PRIOR KNOWLEDGE / EXPERIENCE

Children will have had experience of measuring volume accurately to the nearest 1ml. They will have created tables of results and used these to make graphs.

TOP TIP

A period of exploration before tackling an activity is likely to lead to the children working more productively than if tackling it 'cold'. The activities described in the Fun with Foam section of the CIEC resource The Science of Healthy Skin would work well for this.

www.york.ac.uk/ciec/resources/primary/science-of-healthy-skin/

Alternatively, the fun with foam activities could be used to consolidate or revist the learning sometime after the main lesson.

ACTIVITY NOTES

Introduction: Show children the images on **Presentation slide 2** and ask them if they know what concentrated means. Explain that if a liquid is concentrated it contains less water which means that it can fit into a smaller bottle. Customers need to use a smaller amount of the concentrated product to get the same results as with the 'normal' product. Liquids which can be concentrated include fruit drinks, personal hygiene products such as shampoo and household cleaning products such as washing up liquid or fabric conditioner. Explain that making a more concentrated liquid is another way to reduce transport and packaging costs, because the same amount of 'cleaning power' will fit into a smaller sized container.

TOP TIP

Ideally children should be given as much independence as possible to organise themselves to carry out practical activities., However their ability to do this will depend upon several factors including levels of maturity and past experience. They are more likely to be successful if they are given set roles within the group; and you may find the CIEC role badges useful for this.

www.york.ac.uk/ciec/resources/primary/skills-for-science/#role-badges

It is also valuable to let children make mistakes when they set up their investigations, even when it is obvious to you that it is not going to work. If adults step in too quickly to give advice, children are less likely to learn for themselves than if they have an opportunity to evaluate their own work and plan how they would do things differently next time. In the long term this is likely to lead to more maturity and independence than if we provide too much scaffolding.

MAIN ACTIVITY:

Show children **Presentation slide 3** which has a letter from Innospec asking for their help. The letter uses language which children may need help unpicking (such as 'optimum amount of lather', 'recruiting scientists' and 'fossil fuels'). This is in order to more closely represent the language that would be used in a letter from industry as children respond maturely to this. Children are then asked to work in groups of 4 to devise a test to find out the optimum amount of shampoo needed. This is a challenging investigation for children to plan. They will need to find out how they can tell which amount of shampoo is effective given they cannot wash their hair in the classroom. Children might choose to measure the effectiveness of the shampoo for cleaning something else, such as hands or a piece of soiled cloth for example. Alternatively, they might decide to measure the amount of foam created by a fixed amount of shampoo in a measured volume of water.

This may seem like more time than is available in a busy curriculum for a single lesson. However, such time is well spent, and the learning is likely to be deeper than several different lessons which are more prescriptive. Moreover, not every child in the class will be doing exactly the same thing (a bugbear of many work scrutinies and OFSTED reports). Time for class discussion and evaluation will mean that children will learn from each other's investigations and mistakes as much as they do from their own.

Once children have had a go at designing and trying out their own investigations you could share the instructions on **Activity sheet 4** with them. It contains a modified description of the process used by the scientists at Innospec to measure the volume of foam produced by different products. Children could compare their own method with the Innospec approach.

If children's results and explanatory letters are sent to ***ciec@york.ac.uk*** they will receive a response from the company.

TOP TIP

Provide as many resources as possible for children. However, if they are given time to plan this activity a day or two ahead of carrying it out that will give time for more resources to be gathered, including those that you hadn't anticipated that they would need. It will also mean that you can share the task of providing materials with the children. For example, if one group suggest comparing different brands of shampoo, they can all bring in samples from home.

BACKGROUND INFORMATION

This activity gives an interesting opportunity to show children that it is not only solids (such as salt and sugar) which can be dissolved in liquids. Liquids, such as shampoo and household cleaning products, can also be dissolved in liquids.

The amount of minerals dissolved in tap water varies across the country. Hard water contains relatively high amounts of minerals such as calcium whereas soft water has relatively little dissolved minerals. The relative hardness of the water affects the quantity of product needed to create a foam with more being needed when using hard water.

EXTENSION OR HOME-BASED ACTIVITIES

Children may be surprised to learn that the water used in different parts of the country makes a difference to how much product is needed to make enough foam. If they live in a hard water area (most areas in the UK) you will be able to demonstrate this by repeating the activity with a sample of water that has been boiled and cooled, as this removes some of the minerals (which is why kettles tend to 'fur up' with mineral deposits). If they live in a soft water area you could use some mineral water to represent hard water and demonstrate the difference.

Ask children to look at packets of products that they use in the home including cleaning products, food and personal care products. Ask them to look for any advice about the amount to be used or portion size. They could discuss how well they think that most people follow this guidance.

QUESTIONS FOR THINKING

- Why is it important to use the right amount of shampoo?
- What happens if we don't use enough shampoo?
- What happens if we use too much shampoo?

INDUSTRY LINKS AND AMBASSADORS

If you are able to find a scientist with relevant expertise who can visit your classroom, ask them to bring a range of portable lab equipment they use to carry out the same tests that children have done in the classroom. Images showing the equipment in use, or of larger equipment that can't be taken out of the lab, would be useful for children to see alongside the real equipment.

CROSS CURRICULAR LINKS

English: Write a covering letter to explain their findings, to send to Innospec to accompany their results.

Maths: Select the best method(s) to present their results, and produce appropriate tables or graphs.