

WHAT'S IN A BAR OF SOAP?

Class discussion focuses on the Strictly Classified recipe and why companies must make products in exactly the same way every time. Children experience irreversible changes through the manufacturing process as they mix solid and liquid ingredients, resulting in a bar of soap. They could communicate each step of their soap making by producing a cartoon strip to include scientific vocabulary and equipment used.

TYPE OF ENQUIRY

Observing changes over time

OBJECTIVES

- To create a mixture, by following a recipe, using solid and liquid ingredients
- To communicate what they have done in ways that are appropriate for different audiences

To be able to:

- Understand that mixtures other than foods are prepared using recipes

SCIENCE VOCABULARY

Recipe	Mixture	Measure
Crush	Mix	Compress
Solids	Liquids	

RESOURCES

Per group of 4 children:

- 60-75g soap noodles* or soap flakes
- Weighing scales
- 3 pipettes
- Glycerine (from local chemists)
- Essential oil
(must be suitable for skin, eg aromatherapy oils)
- Food colouring (assorted colours)
- Silicone soap/cake/candle mould*
- Transparent, sealable plastic bag
- Rolling pin (or pestle and mortar, if available)
- Mixing bowl
- Mixing spoon
- Disposable or rubber gloves
- Safety glasses (if available)
- Activity sheets Strictly Classified Recipe and Soap Recipe
- Kitchen Chaos cartoon strip (optional)

* soap noodles and moulds can be sourced online from sites such as eBay or Amazon.

PRIOR KNOWLEDGE/EXPERIENCE

Children should have opportunities to follow step-by-step instructions in the correct chronological order. They should know how to use a pipette, and understand the difference between adding a full pipette of liquid and adding one single drop and how misinterpretation would affect the final product.

ACTIVITY NOTES

At any time during the nine activities in this resource, the Kitchen Chaos cartoon strip can be shared on-screen with the class.

Children are given copies of the Strictly Classified Recipe and asked: Why do companies need to need follow recipes for the products they make? What does 'strictly classified' mean? and Why do you think manufacturing recipes need to be classified? Refer to Questions for thinking to engage children in class discussion about the need for product consistency and how each manufacturer aims to be the market leader, never disclosing recipes to their competitors.

Explain to children that they are going to work in small 'company' groups to follow the manufacturing recipe very closely to produce a bar of soap. First, they must decide upon and allocate Job Roles and responsibilities within the group – this activity is just as much about the children developing personal capabilities such as team work and collaboration as it is about them furthering their knowledge and understanding of mixtures and the skills of working scientifically.

Refer to Safety guidance and check for individuals with allergies before the Resources Manager collects the equipment listed in the Soap Recipe. At every stage of the recipe, children are encouraged to make careful observations and discuss what is happening to their mixture and how it is changing. The solid soap noodles will change to a fine white powder when crushed sufficiently. If available, a more efficient method for crushing noodles is to use a pestle and mortar. This step is not required if using soap flakes.

By adding the liquid ingredients glycerine, essential oil and food colouring, they should observe changes in consistency, viscosity, smell and appearance. When spooning the mixture into the soap mould, it should not be too crumbly. Further drops of glycerine can be added, but too many will make the mixture so sticky that it sticks to the mould rather than release as a soap bar. After compression, the resulting soap bar should be solid.

Children are often extremely proud of the soap they have made and keen to take it home. However, another interesting way to observe changes over time would be to keep the bars of soap in school (maybe give one to each class to keep by the sink) and observe what happens as the soap gets used in the hand washing process over several weeks. It should be noted that the soap bars made in this activity will release colour when used, unlike those purchased from commercial manufacturers! The colour washes away when children rinse their hands.

Children might wish to record the soap making process in the form of a comic strip for others to follow and make their own bar of soap. They should think carefully about their audience, using scientific language and including the amounts of ingredients and equipment used. This activity also links very well to instructional writing and chronological reports.

EXTENSION OR HOME-BASED ACTIVITIES

It is important that children are given opportunities to explore their own ideas and raise different kinds of questions such as 'Which bar of soap produces the most foam?' 'Which bar of soap will last the longest?' or 'How does my bar of soap compare to soap bought from a shop?' They could select and plan the most appropriate type of scientific enquiry to use to answer their questions and this might involve them recognising when and how to set up comparative and fair tests and explaining which variables need to be controlled and why.

Children also enjoy the opportunity to design and make packaging for their soap, with excellent links to aspects of geometry in the mathematics curriculum. They can create posters or advertisements to accompany their products, affording further links with spoken language and writing in the English curriculum.

QUESTIONS FOR THINKING

- What recipes have you ever followed?
- Where are recipes usually used? Why?
- Why do companies need to follow recipes for the products they make?
- Why do you think manufacturing recipes need to be kept top secret?
- How might you improve the soap recipe to produce an even better bar of soap?
- What questions would you like to ask and investigate about your bar of soap?

SAFETY GUIDANCE

Please use the following health and safety information to produce your own risk assessment for this activity:

- Prior to this activity, check for individuals who may be allergic to any of the ingredients used in the soap recipe and also for any children with respiration problems, such as asthma, to take extra caution when crushing soap noodles into a fine powder.
- Disposable or rubber gloves should be worn to prevent any allergic reactions which children may have. As an additional precaution, children could wear safety glasses to prevent the rubbing of soap mixture into their eyes.

INDUSTRY LINKS AND AMBASSADORS

Soap comes in a variety of shapes, colours and textures and children can discuss and/or research how the soap they have made in the classroom is similar or different to large-scale industrial soap making processes. Examples they find might include:

- Soap usually starts with oil or fat being mixed and heated in a large vessel with ingredients including water.
- This hot bubbling liquid is sprayed onto a metal roll where it cools quickly and a large blade scrapes it off, creating ribbons of solid soap.
- The solid 'ribbons' fall onto big steel rollers called mills which mix and compress the soap before pushing it through an extruder that shapes it into soap noodles.
- The noodles are collected and dropped into an enormous mixer where colour and then fragrant oil is added and even more mixing takes place.
- Next, the soap is pushed through a forming plate to make long bars and then sharp blades slice these into shorter pieces called slugs.
- Mechanical presses now shape and stamp the individual pieces of soap before they finally travel through a wrapping station slide into boxes.

Find and watch an informative short video which shows the soap making process in industry. Alternatively, children can use secondary sources such as videos to understand more about how pipes are made in a machine that melts plastic pellets and pushes liquid plastic through an extruder. This is similar to how the liquid soap is pushed through to make noodles or long bars.

The Children Challenging Industry website demonstrates how **toothbrushes** and **plastic bowls** are made using extrusion moulding. There are links here to plastic and toothpaste industries, and children can be encouraged to identify and research other industries where extrusion or injection moulding (material is injected into a mould) is a crucial part of the manufacturing process.

CROSS CURRICULAR LINKS

English: recording the soap making process in the form of a comic strip allows pupils to think carefully about their audience and appropriate language. This activity also links very well to instructional writing and chronological reports.

Mathematics: links to measuring (volume of liquids and mass of soap noodles) and also to learning more about shapes and nets (if carrying out extension activities).

Design and Technology: through soap making, and packaging design, children will select from and use a wide range of materials and ingredients as well as evaluate their functional properties and aesthetic qualities.