5. Increasing viscosity

1.5 hours

Children develop a method for producing and measuring foam, whilst learning that formulation scientists choose ingredients because of their specific properties. They go on to mimic methods used by these scientists to make and test their own bubble bath recipe.

OBJECTIVES

- To test the effectiveness of a selection of thickening agents to increase viscosity of liquids
- To take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

RESOURCES

(Per group of 4 children unless otherwise stated)

- Resources per group of four children 300 ml clear shower gel
- Cup of corn flour
- Cup of salt
- Cup of hair gel
- Teaspoon
- 100 ml measuring cylinder Blu-tack
- Filter funnel
- Laminated card
- Tidy tray
- Timer
- 3 disposable cups

ADVANCE PREPARATION

Mix the shower gel with 200 ml water to produce a thin clear gel solution. Label this 'bubble-making ingredient'.

Label the cornflour, salt and hair gel, 'powder', 'granules' and 'gel' respectively.

INTRODUCING THE ACTIVITY

Use the website area Fun with Foam - A Runny Problem. This web page introduces the children to the concept of viscosity. The children are asked to consider how they could measure how thick or runny a liquid is. After time for discussion and sharing of ideas, by returning to the web page, the children learn that Sumptuous Skincare's scientists need to produce a bubble bath of a specific thickness, and their current key ingredient is too runny. The company has provided 500 ml per group of this ingredient for the children to use in their investigations. They have also sent some additional items that might thicken the bubble-making ingredient.

ACTIVITY

The teacher should make each group aware that the 500 ml of bubble-making ingredient is provided for all their tests.

The groups plan and carry out their investigations, incorporating the principles of fair testing. They need to consider (i) amount of bubble-making ingredient to use each time, (ii) amounts of thickener to add, and whether to add this gradually, and (iii) how to measure the thickness of the liquid.

Ideas for measuring the viscosity include timing:

1. the fall of a marble or similar through a measuring cylinder of the sample
2. the flow of the sample through a funnel
3. 'blobs' of the sample moving down a tipped surface (tray, laminated card etc.)

They also consider the appearance, feel[1] and end use of the product.

Children should be encouraged to find ways of recording their results independently and in a variety of ways such as tables, graphs, posters, diagrams or photographs.

PLENARY

Each team shares its conclusions with the class using 'snowballing', 'envoying' or 'jig-sawing', as described in Appendix 2. Alternatively, each group in turn could demonstrate its most effective method to the class. The webpage area In the thick of it offers an opportunity for reinforcing the children's conclusions from the investigation.

INFORMATION FOR TEACHERS

The salt will cause an increase in viscosity and will result in a clear, viscous, gel-like mixture. Flour will give an opaque sticky viscous liquid and hair gel will not produce much thickening until large quantities are added. The addition of too much salt will cause a drop in viscosity so this should be added very slowly in small quantities (pinches) with gentle stirring.

1 Teachers should ensure that precautions are taken to prevent allergic reactions to products used. Children could wear protective gloves. Consult ASE's 'BeSafe! ' for guidance.

Appendix 1

Role Badges

All of the classroom sessions involve children working together in groups of four.

Each child is responsible for a different job or role within the group and wears a badge to identify this. The images below may be photocopied onto card and made into badges, by slipping them in to plastic badge sleeves. Keep sets of badges in 'group' wallets, to be used on a regular basis in your other science lessons.

Children should be encouraged to swap badges in subsequent lessons; this will enable every child to experience the responsibilities of each role.

Administrator keeps a written and pictorial record for the group

Resource Manager collects, sets up and returns all equipment used by the group

Communications Officer collects the group's ideas and reports back to the rest of the class.

Health and Safety Manager takes responsibility for the safety of the group, making sure everyone is working sensibly with the equipment.

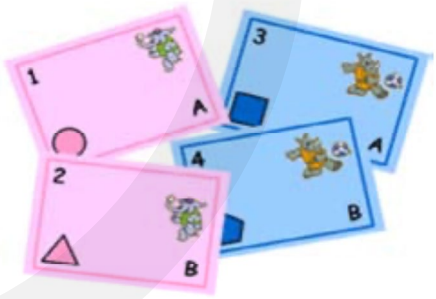
Where groups of 5 are necessary, the following role can be used:

Personnel Manager takes responsibility for resolving disputes within the group and ensuring the team works cooperatively

Appendix 2

Discussion strategies

The following strategies are used extensively as part of the Discussions in Primary Science (DiPS)[1] project, and have been proven to be successful when developing children's independent thinking and discussion skills.



Talk cards

Talk cards support the teacher in facilitating these discussions, with the letters, numbers, pictures and shapes enabling the teacher to group children in a variety of ways.

The example provided here shows one set for use with four children. The set is copied onto a different colour of card and talk groups are formed by children joining with others who have the same coloured card.

Children can then pair up by finding a partner with the same animal or a different letter eg. elephant, rhino or a + b pair. Each TALK pair would then have a card with a different number or shape.

The numbers or shapes may then similarly be used to form alternative groupings and pairings.

Note: The example talk cards are provided in MS Word format so you may make changes if you wish.

ITT (Individual Think Time)

Each child is given time to think about the task individually before moving into paired or group work.

Talk Partners

Each child has a partner with whom she/he can share ideas and express opinions or plan. This increases confidence and is particularly useful where children have had little experience of talk in groups.

A > B Talk

Children take turns to speak in their pair in a more structured way, e.g. A speaks while B listens B then responds. B then speaks to A while A listens and then A responds to B.

Snowballing

Pupils first talk in pairs to develop initial ideas. Pairs double up to fours to build on ideas. Fours double up to tell another group about their group's ideas.

1 For more information go to www.azteachscience.co.uk

Envoying

Once the group have completed the task, individuals from each group are elected as 'envoys', moving on to a new group in order to summarise and explain their group's ideas.

Jigsawing

Assign different numbers, signs or symbols to each child in a group. Reform groups with similar signs, symbols or numbers, e.g. all reds, all 3s, all rabbits and so on. Assign each group with a different task or investigation. Reassemble (jigsaw) the original groups so that each one contains someone who has knowledge from one of the tasks. Discuss to share and collate outcomes.