1. Mixing muddle

40 mins

The children classify a range of everyday liquids from water to shampoos, according to their physical properties.

OBJECTIVES

- Compare and group materials together, according to whether they are solids, liquids or gases.
- To recognise the characteristics of a liquid.
- To classify a range of liquids according to properties.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.

RESOURCES

(Per group of 4 children unless otherwise stated)

- Activity sheets 1-3
- Small pop bottles – 280 ml or 330 ml[1] sizes
- Range of liquids from viscous to runny; 1-2 liquids from each column below:

Very thick	**Medium**	**Runny**
Baby shampoo	Washing-up liquid	Water
Shower gel	Baby shampoo	Vinegar
Foam bath	Fabric conditioner	Window cleaner
Cellulose paste	Fairy Colour	Fizzy drinks
Tomato sauce*	Vegetable cooking oil	
Salad cream*		
Golden syrup*		

* *These tend to be rather messy, so are suggested as second choices.*

ADVANCE PREPARATION

Cellulose paste (e.g. PlayArt by Scola) is best made up previously, and diluted to the required consistency. For a very thick consistency i.e. a spoon will stand up in it, use a rounded dessert spoon of powder per pint water (approx. 7 g powder per 500 ml water). Stir the powder into the water for a minute, and allow to stand for 10 minutes. Stir again for a minute and the mixture is ready for use.

Pour 100 ml of each of the liquids into separate, clean and dry small pop bottles, and secure the top. Label and number the contents.

1 Throughout these notes millilitres ml are used rather than cubic centimetres cm3. They are virtually identical in volume, although the millilitre is not the internationally recognized unit of volume.

INTRODUCING THE ACTIVITY (10 - 15 MINUTES)

Read the letter provided on Activity sheet 1 to set the scene and identify the problem. Discuss the letter with the class, asking questions such as:

- Why does the company need the material as a liquid?
- What are the advantages/disadvantages of this type of material?

Ask the children to write down anything they know about liquids, no matter how simple. The concept map on Activity sheet 2 allows the children to link ideas related to solids and liquids, and is a useful guide for the teacher as to any misconceptions the children may have. Activity sheet 3 gives an opportunity for the children to record their results visually. Alternatively, responses can be written on the board, or large sheets of sugar paper, for reference during the work.

Safety note

Do not leave old labels on pop bottles. A child may think the new contents are the old.

MAIN ACTIVITY (15 - 20 MINUTES)

Ask the children to try sorting the bottles of liquids into groups. This can be done by placing P.E. hoops on the floor with labels, and placing the bottles in the appropriate hoop. Their criteria may be colour, purpose, smell, runniness, etc. Ask the groups to list the different ways they have sorted the materials. In the context of the problem, which of the sorting criteria would be most useful? The company is having problems with the stirring and runniness of their liquid, so questions to pose could include:

- Will the colour of the liquid have any effect on its ease of stirring?
- Does the smell of the liquid affect its runniness?
- Does the use of the liquid have an effect on its ease of stirring?

Point out to the children that colour, smell, etc. are valid sorting criteria, but in this context, runniness is the important property to investigate.

Using the results of those groups who have used 'runniness' as their criteria, line up the liquids in order of 'runniness' and list them. Activity sheet 3 can be useful for less able children, by writing the names on the pictures of pop bottles in the same order as the line-up of bottles.

PLENARY (5 MINUTES)

The plenary should establish that liquids flow, with varying ease, and take up the shape of their container. Questions to provoke discussion can include:

- *Is shower gel a liquid?*
  It flows, so can be classed as a liquid, but a very thick one.
- *What makes all liquids the same?*
  Liquids flow, and take the shape of the container they are poured into.
- *What makes liquids different from solids?*
  Liquids flow, and change shape. Solids cannot change shape.