2. Will it float?

45 mins activity

Children investigate and identify four unknown plastics by testing samples for their floating or sinking properties.

OBJECTIVES

- Compare, identify and name everyday materials on the basis of their properties, including floating and sinking
- Pupils should use and develop keys and other information records to identify, classify and describe materials

RESOURCES

(per group)

- 1-litre measuring jug, or bowl of similar capacity Salt
- Teaspoon
- Plastic pieces (see below)
- Activity sheet A2a and A2b

Pieces of PVC, polythene, polystyrene and expanded polystyrene should be cut to approximately 8cm x 1cm (see Appendix 1 for items made from these plastics). The strips are then numbered 1 to 4 with a permanent marker. To put the plastics pieces in a context, allow the children to see the items which have been cut up. Transparent pieces are partially coloured with a permanent marker, as they are very difficult to see when added to the solution.

Alternatively, a selection of coloured plastics are shown in the table below.

Container	Colour	Plastics type
Fabric conditioner bottle	Blue or pink	Polythene
Shampoo bottle	Green	PVC
Yogurt pot	White	Polystyrene
Lemon juice bottle	Yellow	Polythene
Burger box	Gold	Expanded polystyrene

N.B. Items that can be used in a microwave oven or freezer will not be made from polystyrene.

If children associate the colour of plastics with density, carry out a second test with plastics pieces all the same colour, either white or transparent, to show that this is not the case.

As it is not certain that an object is made from a specific plastic it is important that the teacher checks the identity of the selected items before presenting the activity to the children.

CARRYING OUT THE ACTIVITY

Children half fill the jug with water and place each sample piece under the water before letting it go. The contents are stirred. The pieces of polythene and expanded polystyrene will float as they are less dense than water.

Salt is added to the water a teaspoon at a time, stirring after each addition. The piece of polystyrene will begin to rise and will float after 2-3 teaspoons of salt have been added. The piece of PVC will stay at the bottom.

QUESTIONS FOR THINKING

- Are pieces floating if they are in the middle of the water?
- Why did some pieces float and others sink?
- Why did one piece at the bottom float when the salt was added?

BACKGROUND INFORMATION

The table below shows the density range for the four plastics types. The density of water is 1.00 g/ml[1]. The piece of expanded polystyrene will float as the density is far less than that of water. Polythene also floats.

As salt is added the density of the solution increases. When the solution's density is greater than the density of polystyrene it will float (the polystyrene will be suspended when the density of the salt solution is the same as that of the polystyrene).

This effect is similar to that of a person floating higher in the denser water of the Dead Sea than other seas. The teacher might like to ask the children if they know about this effect.

Plastics type	Density in g/ml*
Expanded polystyrene	0.02-0.06
Polythene	0.91-0.96
Polystyrene	1.04-1.11
PVC	1.20-1.55

Density = mass/volume

EXTENSION

The children investigate the effects of adding other substances to the water (such as sugar, sand, etc.) to find out the effect of this on the floating/sinking of the plastics samples. This will help reinforce the concepts of dissolving and density, if the teacher wishes to emphasise these ideas.

1 Throughout these notes millilitres (ml) have been used rather than cubic centimetres (cm3). The two units have the same numerical value.

Appendix One

SOURCES OF PLASTICS

The following objects may be made of the plastics indicated.

Polythene - high density	Expanded polystyrene
bowls, buckets, beakers	ceiling tiles
piping e.g. water pipes	non-fibrous loft insulation
large cases	fast food packaging
milk crates	meat and food trays
dustbins	packaging (especially delicate instruments)
bleach bottles	head protection (e.g. cycling helmet)
doll's bodies	disposable cups for hot liquids
large toys	foamed material (sponges)
pressure pipes	egg boxes
kitchenware	

PVC	Polythene - low density
drainpipes	squeezy bottles/tubes
gramophone records	cable insulation
wellington boots	film for bags and packaging
wallpaper (washable vinyl)	back of carpets(e.g. car carpets)
table cloths	ink tubes in ball-point pens
shower curtains	food storage containers
baby pants	**Polystyrene**
macs	clear storage containers/jugs in kitchens
artificial leather	food containers, e.g. yoghurt cartons, clear
flooring e.g. kitchen	egg boxes
DIY blister packs	model kits e.g. Airfix
hosepipes	ball-point pen and fountain pen cases
plastic cutlery	plastic coat hangers
watch straps	