

Teacher and Technician Sheet

In this practical students will:

- Carry out and carefully observe results of the practical.
- Apply their understanding of mixtures and hydrophobic solutions to explain observations.
- Evaluate the results of the two experiments, determining which is better- and explaining why this method is better.

Introduction:

This uses the ideas developed in the practical activities 'Oil and water mix', 'Water drop art' and 'Making an oil/water emulsion' in a practical way to produce an art product.

It can be introduced by talking about the previous investigations into the way oils and waxes do not mix with water. This can be helped by using any records such as drawing, photographs or writings collected in the previous practical activities.

With older students the focus is on the way different materials react when they can form charged particles and the way intermolecular forces of attraction can be used; in this case to produce an artistic effect.

Curriculum range:

Primary age but can be used with younger secondary age students to investigate materials. It links with:

- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions;
- using straightforward scientific evidence to answer questions or to support their findings;
- comparing and grouping together everyday materials on the basis of their properties;
- knowing that some materials will mix, while others do not;
- knowing that liquids that do not mix can be turned into emulsions; and
- building a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials.



Hazard warnings:

There are no hazards with this investigation but there is a warning that some food colourings can stain the skin. To prevent this it is advisable to give the students plastic gloves to wear. Supervise students' use of pressurised containers.

Wear disposable plastic gloves for the extension activity.

Alum: Aluminium potassium sulfate(VI)-12-water (Low Hazard)

Equipment:

- At least 1 piece each of different sorts of white paper; printer, cartridge, tissue, etc. different effects can be achieved depending upon your selection
- Cheap shaving cream, perhaps a scented one. Peppermint or a floral scented shaving cream or hair mousse will make your marbled paper fragrant
- Red, green, blue and yellow food colouring, ink or poster paints
- Plastic tray approx. 30 cm by 20 cm, or large enough to take your paper
- Disposable plastic pipettes or eye droppers for each colour
- 1 spoon or spatula
- 1 fork or spill or toothpick
- Squeegee cloth (or ruler) and paper towels
- String and pegs to hand the paper to dry (or somewhere flat to lay them)
- Newspaper to cover the work area and place the sheets onto

Going Further:

It is possible to make a more substantial marbled paper by using the **Going Further** method:

Equipment:

- 15 g of alum
- Balance
- 2 weighing boats
- 2 spatulas
- Measuring cylinder
- 475 cm³ of warm water
- 2 beakers (600 cm³)
- 1 fork
- 3 sheets of non-glossy plain paper
- 1 medium paint brush
- 57 g of corn starch



- 60 cm³ cold water
- 475 cm³ hot water
- Shallow tray approx. 30 cm by 20 cm, or large enough to take your paper
- Blue and red food colouring or acrylic paint thinned out with water to the consistency of milk
- 2 eye droppers
- 1 comb
- 3 sheets of newspaper
- String and pegs to hang the paper to dry (or somewhere flat to lay them)
- Newspaper to cover the work area and place the sheets onto

Wear disposable plastic gloves

Technical notes:

Hair mousse works as well. It doesn't stay foamy as long as shaving cream but long enough to make the pattern and take a print of it onto paper. Generally they smell quite pleasant too and some of this may transfer to the finished dried paper.

Poster paints and the acrylic paints may need thinning with water before using.

A ruler can be used to scrape off the excess foam if a sponge isn't available.

The material suggested for the extension activity could probably be halved and still make plenty for a group to carry out the practical.

Almost anything can be used to make a pattern in the foam or size; use a straw or blow gently through a straw, pull thread through the foam, etc.

Results:

More of the colour washes off when the first method is used (shaving cream).

The second method, using the alum solution (mordant) and size, results in a more pronounced colour pattern that is fixed onto the paper. It's also easier to create better and more intricate patterns with this method.

With both the first and second method there were different results depending upon the type of paper used. I found that plain A4 worked best with the thicker type of A4 paper the easiest to use.

Colour will wash off any parts that have not been covered so it may be better to use a soft sponge rather than a brush to cover the paper without making it too wet.



Whichever method is used the resulting marbled paper is pretty spectacular. It's a shame that this practical would be restricted by the amount of drying space available!