4. Salt for my chips!

Children make observational drawings of dry rock salt and table salt. They then compare the rock salt and table salt in solution, noticing that both salts dissolve but rock salt contains solids that do not dissolve. Children then plan an investigation to clean rock salt used for de-icing roads, so that it is pure enough to sprinkle on chips. This introduces the children to the processes of crushing and filtering.

OBJECTIVES

- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

RESOURCES

Copies of Activity sheet S10, rock salt, table salt, magnifiers, filter paper or paper towels, funnel, transparent containers (e.g. miniature pop-bottles), freezer bags and fasteners, rolling pin, heat source, e.g. tea-light, hair-dryer or desk lamp, heat stand, sand, foil dish. Other resources, depending on children's investigations.

The children observe dry rock salt and table salt, preferably with a magnifier, and draw them on Activity sheet S10. Their attention should be drawn to the relative shape, size and colour of the salts. Both types of salt have regular cubic shapes, though the rock salt crystals are larger and coloured and the additional solid impurities can be seen clearly.

Safety note

Children require close adult supervision when using a cooker hob, tea-light or hair-dryer. All mains appliances used in schools must be checked annually. The children should be warned of the dangers of burns and scalds.

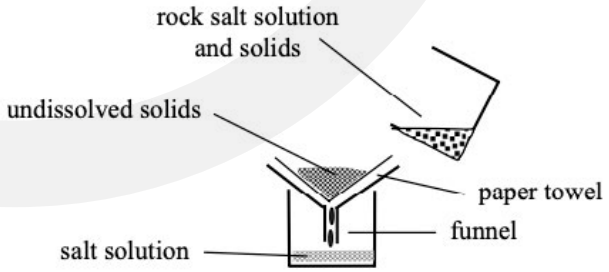
The children compare the rock salt and table salt in solution, stirring or shaking a bottle of solution to accelerate the rate of dissolving. They should notice that both salts dissolve, but that rock salt contains solids that do not dissolve, which can be seen at the bottom of the salt solution.

Finally, the children are challenged to "Clean the rock salt so that it is pure enough to sprinkle on chips."

This challenge is presented on Activity sheet S10 with the processes (not in the correct order) they need to use. Some processes have been dealt with in previous activities but children may need advice on crushing and filtering. The crushing process accelerates the rate of dissolving. To crush the salt place it in a freezer bag, fasten with a 'twister', and roll with a rolling pin.

N.B. *If the children have access to scales sensitive to a few grams, more able children can be asked to find out how many grams of table salt can be obtained from 50 grams of rock salt.*

From earlier observations the children should appreciate that dissolving rock salt results in other solids being separated from the salt. This solution can be filtered using filter paper or paper towel cones, leaving solids on the filter and a cleaner solution in a fresh container.



The salt can be retrieved by evaporating the water. This process can be repeated to obtain purer salt.

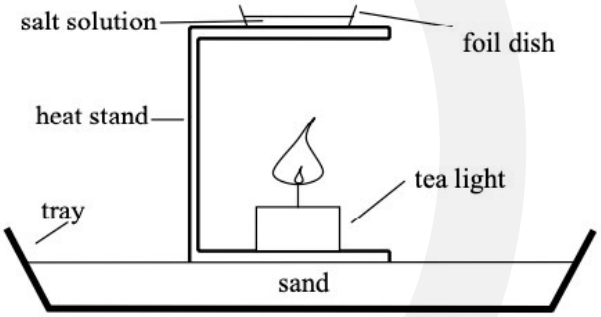
RECORDING THE ACTIVITY

Children produce a step-by-step account in words and pictures of the process they used to obtain 'table salt'. The written account should be limited to 50-100 words, to encourage children to write concisely. The final sample of salt can be displayed alongside commercial table salt, original rock salt, filter residues (which are finer with each filtration), children's work and their equipment.

HANDY HINTS

Use the quickest evaporation method possible, within the constraints of safety and adult supervision levels. Filtration of a tea-cup of salt solution takes about 15 minutes and evaporation over a cooker hob takes 10-20 minutes. Ledges over hot radiators or high wattage bulbs in a desk lamp provide reasonable alternatives, though they will require more time.

Another method that can be employed as shown in the diagram below. Evaporate 1 teaspoon of salt solution in a foil dish using a heat stand and a tea light candle. This method takes 10-15 minutes for 10-15ml.



EXTENSION ACTIVITY

The children can be introduced to other applications of this 'extraction' process, i.e. the manufacture of instant coffee and tea by dissolving of the tea or coffee followed by evaporation of the water. They could try out the process for themselves.