

4. EXTRACTING STARCH FROM POTATO PEEL

1-2 HOURS

This activity will need to be carried out at least three days prior to using it to make bio-plastic.

Children experience a novel application of sieving, filtering and evaporation as methods of separating a solid mixed with a liquid. They will discover that useful substances can be extracted from 'waste' materials by separating starch from potato peel. They will experience both reversible and irreversible changes as they recognise that the starch can be mixed back with the water, but cannot be returned to the potato.

TYPE OF ENQUIRY

Observing changes over time.

OBJECTIVES

Explore reversible changes, including evaporating, filtering and sieving.

TO BE ABLE TO

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.

SCIENCE VOCABULARY

solid	liquid	mixture
evaporate	sediment	filter
mixture	mix	reversible
irreversible	'green'	extract

RESOURCES

Per pair of children

- About 100g of potato peel (school caterers, local restaurants or chip shops may well be willing to provide potato peel free of charge)
- 2 x 1 litre jug
- Petri dish, saucer or plate
- Pop sock or leg from a pair of old tights
- All groups will also need access to a means of pureeing or grating the potato peel eg. a cheese grater or an adult can use a food processor or blender
- Activity sheet 8 (optional)
- Activity sheet 9. This can also be shared with families either on the school website or by sending copies home

PRIOR KNOWLEDGE/EXPERIENCE

Children should have had opportunities to follow step by step instructions in the correct chronological order. They should be able to pour liquids carefully in order to decant the liquid from the sediment.

ACTIVITY NOTES

This activity will need to be carried out at least three days prior to using the starch to make plastic.

Activity sheet 8 may be used at this stage to assess and, if necessary, reinforce the vocabulary used in this and the following activity.

Begin by explaining that some materials are made up of lots of different 'ingredients' or substances. For example, you might give the example of a water melon or pumpkin which has flesh, seeds and skin which can be separated from each other.

Tell children that not all ingredients are visible like the seeds in a melon, but can often be invisible to the human eye. You could demonstrate this by showing children how salt or sugar cannot be seen once dissolved into water although we know that it is there and it can still be tasted. Explain that scientists are able to find these hidden ingredients and take them out or 'extract' them.

Explain that 'Green Scientists' are scientists who find ways to use waste which would otherwise end up in rubbish tips. Today the children are going to find out how Green Scientists are able to extract a hidden ingredient, called starch, from potato peel. Tell them that the potato peel is a waste product that would otherwise be thrown away. Starch is a substance which has many uses, as they will soon find out.

The next stage should be carried out by an adult. The potato peel will have to be broken down finely with at least an equal amount of water using a food processor or blender. Alternatively, if whole potatoes are being used children can use a potato grater to break it down. This allows children to work more independently, although the potato will be broken down less finely.

The resulting puree is a mixture of water and solids that have been broken down very finely. The more finely the potato peel is broken down at this stage the more starch the children will be able to extract.

The puree will need to be poured into the foot of a pair of tights. Children can take turns to squeeze the tights to obtain as much liquid as possible. When they are sure that they can squeeze no more liquid from their potato mixture, the remaining solids can be disposed of. Ideally they should be placed in a compost heap.

The children will be left with a cloudy mixture. Explain to them that the cloudiness is caused by tiny particles of solid suspended in the water. These are the particles of solid which were small enough to be squeezed through the holes in the tights along with the water.

Within a few minutes, they will notice that the solids begin to sink to the bottom of the jug. They can be told that when solids separate out of a mixture in this way, it is called a sediment. The cloudy mixture will need to be left for about ten or fifteen minutes before the next stage can take place.

Once the water is clear it can be carefully poured away leaving the potato starch at the bottom of the jug. Separating sediment from a liquid is one way that scientists separate materials. If there is a lot of mud or other impurities mixed in with the starch, water can be added and the mixture stirred and allowed to settle again to allow some of the dirt to be washed away.

Encourage the children to notice the properties of the solid particles that they have separated from the mixture. They may comment that they look and behave like 'ooblek' made from mixing cornflour and water. You could point out that cornflour is starch that has been extracted from corn and that potato starch and corn starch can be used in similar ways.

The potato starch can be put in a petri dish or saucer, to allow the remaining water to evaporate. Within a day or two you should be left with a fine white powder which can be used in the next activity to make plastic.

A copy of the instruction sheet could be sent home with children or it could be shared on the school website as an optional activity to share with families. As well as reinforcing the learning this has the potential to raise the science capital of the whole family.

QUESTIONS FOR THINKING

- What does the potato peel look like before and after it has been blended?
- Is the 'stuff' that we squeeze from the tights a gas, a liquid, a solid or is it a mixture?
- Where did the potato starch come from?
- How did we separate the potato starch from the rest of the potato?
- Could we put the starch back in the potato?
- Can you describe the wet potato starch?

SAFETY GUIDANCE

Please use the following health and safety information to produce your own risk assessment for this activity.

- Prior to this activity, check for individuals who may be allergic to potatoes
- Teachers should operate the blender or food processor
- If using a grater children will need clear guidelines how to do this safely