

This activity sheet has been developed by scientists at the Medical Research Council Human Reproductive Sciences Unit as part of a wider initiative which aims to support teachers in nurturing their pupils' interest in science. The overall aim of the initiative is to contribute to the creation of a generation of young people comfortable with science as an integral part of everyday life and open to the opportunities science offers as a career.

DNA Extraction

Objective

To learn about DNA. To extract DNA from fruit/vegetables and so see DNA for themselves, therefore emphasising its presence and role in all cells

Context in real-life

DNA is the blue-print/instructions for all organisms. This experiment is a simplified version of how scientists get DNA from other cells like human skin or hair for forensic investigations or paternity tests.

Links with the curriculum

Concept of DNA and its role in cells to regulate all cell functions, characteristics, etc.

Kit needed

- 50g peas
- 10ml washing-up liquid
- 3g salt
- 90ml distilled water
- 10ml ice-cold ethanol
- Ice and water-bath
- Coffee filter paper
- 1 cm³ plastic syringe
- Plastic funnel
- 250ml beakers
- Test tube
- Masher/spoon

Description of experiment

1. Dissolve salt in water and add washing-up liquid. Mix gently
2. Mash peas using spoon/masher and add to salty water solution.
3. Stand in water-bath at 60°C for exactly 15mins.
4. Cool in ice-bath for 5mins stirring frequently.
5. Filter mixture into 2nd beaker through coffee filter/funnel. Transfer liquid into test tube.
6. Holding the test tube at a 45° angle, very carefully and slowly pour ice-cold ethanol down side of test tube to form a layer on the top of the pea extract.
7. Leave to stand for few minutes undisturbed so the DNA precipitates out into the upper ethanol layer as fluffy clouds.

Likely outcomes and what they mean

Children should see white fluffy clouds of DNA floating in the mixture. This means they have extracted DNA successfully and can see what DNA looks like to the naked eye. Note that there is a lot of DNA present, hence why it can be seen but that scientists would be working with many less cells and so would end up with tiny amounts of DNA, which would probably not be seen by the naked eye.

Opportunities for extension

- Extract DNA from other cell types such as kiwi fruit.
- Add protease to the mixture before ethanol precipitation step to remove any protein contamination – teacher will need to explain differences between DNA and protein and why scientists would want to get rid of proteins from the DNA.

This activity sheet is one of several developed by early career scientists at the MRC Human Reproductive Science Unit in Edinburgh. You can download all the activity sheets at www.hrsu.mrc.ac.uk/schools. If you experience problems accessing the website, please email schools@hrsu.mrc.ac.uk.

These protocols are thought to be suitable for S1/S2 pupils but all schools should conduct the necessary risk assessments before performing the experiment.