

Extracting DNA from a Kiwifruit (genetics)

What you need

One Kiwi fruit

100 millilitres of water

1/2 teaspoon salt

2 teaspoons washing up liquid

30-50 millilitres of ethanol or methylated spirits (these substances are dangerous and potentially harmful and should be used with adult supervision only)

One coffee filter paper or equivalent

Measuring jug

Two jam jars, one must be clear glass and as narrow as possible

Thermometer

Saucepan

Background information

DNA is the substance within every living cell that contains the instructions for life. If you have ever tried to build a model aeroplane or boat or bought a Lego kit to make a Harry Potter castle you will realise how important instructions are. They tell you which bits to use first and how to build on these to make the complete model fit together correctly and work. DNA is exactly the same. It contains the instructions that living things use to build different kinds of cells in the right places to form a body, plant or fruit that can function correctly.

DNA is contained within the nucleus of every cell, where it is bundled into compact structures called chromosomes. In order to understand how DNA works, how it forms instructions or codes that allow one cell to become part of a muscle and another to turn into a neuron for instance, scientists have to be able to get their hands on this stuff. They need to extract DNA from the nucleus and from the cell so they can study it, cut it up and manipulate it.

The procedure scientists use everyday around the world to do this is very straightforward. In the following experiment you will be able to pretend you are a molecular biologist and by following the simple procedure you will be able to extract and see DNA for yourself.

The easiest way to get a grip on DNA is to take it from a fruit such as a Kiwi. Kiwis are ideal for this experiment as they contain lots of natural proteases, which are enzymes that chew up proteins, making it easier to get the DNA out without a lot of other muck in the way.

What do you do?

Step 1

- First you need to make a solution that will be used to help break open all the cells of the Kiwi fruit and dissolve the membrane around the nucleus, releasing the DNA.
- Measure 100ml of water and put this in a jam jar.
- Add ½ a teaspoon of salt and 2 teaspoons of strong washing up detergent.
- Mix the solution gently so the salt dissolves.

Step 2

- Peel and chop up the Kiwi fruit into pieces as small as possible
- Add the Kiwi fruit to the solution from step 1

Step 3

- Warm some water in a saucepan until it reaches 65 degrees centigrade
- Place a lid on the jam jar with the kiwi solution in it and place the jam jar in the saucepan of warm water for 15 minutes

The salt and detergent solution along with the increased temperature help to break open the cell membranes within the kiwifruit, releasing the DNA into solution.

Step 4

- Take the jam jar out of the saucepan of warm water and filter the solution into a clean narrow glass jar, through a coffee filter of equivalent paper.

Step 5

- To make the DNA come out of the solution gently add 30-50 millilitres of ethanol of methylated spirits to the filtered kiwi mixture.

The ethanol will sit in a clear layer above the green liquid of the kiwi fruit solution. At the interface between the ethanol or methylated spirits and the kiwi solution, a white precipitate will form, resembling cotton wool, this is the kiwi DNA.

What a lot of DNA a kiwi fruit contains!

Why do you think DNA forms a precipitate in alcohol?