



DNA Extraction in the Kitchen (30 minutes)

Please read this protocol fully and take note of the precautions on the back before beginning.

APPARATUS

Chopping Board
 Knife
 Hand-held food processor (optional)
 1l measuring jug
 250ml measuring jug
 Tea-strainer/sieve
 Teaspoon/medicine spoon
 Tall glass/spice jars/champagne flutes
 Paper clip
 Bowl of cold water

INGREDIENTS

Vegetable/fruit about 3 x 3 x 3cm (~50g)
(Try onions, strawberries & kiwi-fruit. We find red onions are good as they do not make you cry as easily as white or brown onions.)
 Detergent
(washing-up liquid & shampoo work well)
 Methylated spirits
(put in freezer for 1h before use)
OPTIONAL: Meat tenderiser (found in oriental supermarkets)
Table Salt (non-iodised type)

METHOD

- Finely chop vegetable & put into the 1l jug
- Add 100ml of water
- Blend vegetable with food processor for 10-20sec in the 1l jug
- Add 1tsp salt
- Add 1tsp detergent

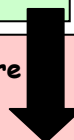
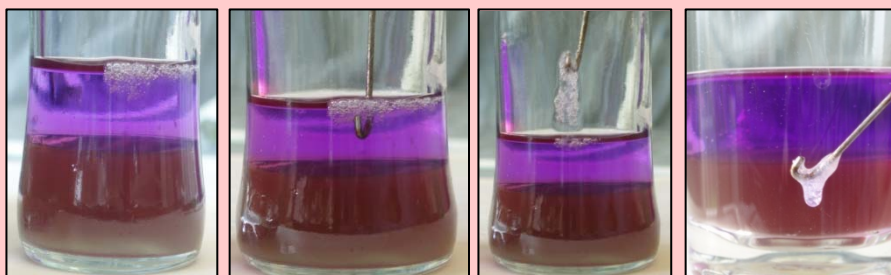


- *(Optional stages:*
- *Add 1tsp meat tenderiser*
- *Mix and stand for 10-15 min*
- *Chill mixture in a bowl of cold water for 5 min.*
- *It is harder to extract DNA from some vegetables. You may need to follow these stages if you don't get DNA the first time)*

- Strain the mixture through a tea-strainer into a jug
- Pour a small quantity of the mixture into a tall glass
- Pour methylated spirits carefully down the side of the glass to a depth of about 3cm.



- Small bubbles will appear and float up. These drag the strands of DNA out of the vegetable mixture
- The DNA will form small wispy strands like cotton wool
- Use the bent paperclip to lift out the DNA
- You can store the DNA by drying it on a piece of dark cardboard, or putting it into a small amount of methylated spirits in another spice jar





Paperclip hook

Take a paper clip and straighten it.
Bend one end to form a small hook.



PRECAUTIONS:

- Some steps should be carried out by adults or under their supervision.
- Please take care when handling knives and the blender.
- **DO NOT DRINK** any of the vegetable mixture or the methylated spirits.
- Dispose of the solid waste in a bin and the liquid waste down the sink. Flush the sink with copious amounts of water to dilute the methylated spirits.
- Please note that the methylated spirits is highly flammable (keep away from flames), and is poisonous - **DO NOT DRINK**.

WHAT IS HAPPENING?

Depending on the type of tissue, the first step is to break it up. This can be done by various means, the simplest being mechanical disruption e.g. chopping or blending.

The tissue is then mixed with water and detergent which helps to dissolve the fats and disrupt the cell membrane. At this stage salt may be added along with proteases (enzymes that break up proteins), in the form of meat tenderiser, to aid the release of the DNA. Heat may be applied, again to aid extraction of the DNA.

In order to remove the DNA, a number of methods have been developed for scientists that exploit the chemical nature of the DNA. These ensure that the DNA is extracted in a pure as form as possible.

The crudest method relies on how DNA dissolves in a water-ethanol mixture. In this method, we add methylated spirits so that it forms a layer on the denser vegetable mixture. As the methylated spirits dissolve into the vegetable mixture, it causes the expulsion of dissolved gas and the precipitation of the DNA. The gas forms bubbles on the DNA and helps pull it in to the surface through the methylated spirits.

This process is very similar to that used in the laboratory, except that we use more refined methods or kits to optimise the amount of DNA extracted, the time and the number of samples extracted.

For more information, search the Internet for 'DNA extraction'.