# DNA ISOLATION



## MATERIALS NEEDED

1-ounce (30 mL) plastic condiment cup
Test tube, 16 x 100 mm (disposable culture tubes recommended)
Test tube, 12 x 75 mm (disposable culture tubes recommended)
Corks or stopper to fit 16 x 100 mm test tubes
Plastic stirring rod (coffee stirrers recommended)
Fresh water, suitable for drinking
8% sodium chloride solution, NaCl (dissolve 8.0 g in 92 g water OR add ½ tsp. Salt to 3 Tbs. [15 mL] water. Place in dropper bottle.)
10% sodium laural sulfate solution OR 25% solution of liquid dishwashing detergent. (Add 25 mL liquid dishwashing detergent to 75 mL or water. Place in dropper bottle.)
ethanol, ethyl alcohol, $C_2H_2OH$, 95%, denatured. (Place in dropper bottle.)
Optional: Microscope slide
Optional: Microscope (30x or greater magnification)

## PROCEDURE

### Collect cheek cells

Obtain a 16 x 100 mm test tube and a 30 mL plastic cup containing approximately 10 mL (2 tsp.) of fresh water.

Swirl the water in your mouth for 30 seconds. Spit the water into the plastic cup. The swirling of the water washes cells from the inside of your cheeks into the water.

Pour the water into the test tube to fill it approximately half-way.

Add 1 mL (20 drops) of 8% sodium chloride solution to the water in the test tube. Mix well by stoppering the test tube and inverting it back and forth several times. Do **not** shake the test tube.

### Release the DNA from inside the cheek cells

Add 1 mL (20 drops) of 10% sodium laurel sulfate solution OR 1 mL (20 drops) of 25% liquid dishwashing detergent solution to the mixture in the test tube. Stopper the test tube and mix the contents of the tube by gently inverting the test tube several times. DO NOT SHAKE THE TEST TUBE. The detergent removes the cell membranes from the cheek cells, releasing the DNA into the salt solution.

### Precipitate the DNA

Holding the test tube at a slight angle, carefully add 5 mL (1 tsp. Or 100 drops) of 95% ethanol down the side of the test tube so that it forms a layer over the mixture in the test tube.

Hold the test tube upright for one minute and observe what is happening at the interface between the alcohol and the water solution.

The cloud of white strands is the DNA. The DNA is not soluble in ethyl alcohol, so it precipitates where the two liquids meet. Bubbles from the water solution will get trapped in the DNA strands.

**Collect the DNA**

Add 1 mL (20 drops) of ethyl alcohol to the small test tube. Set this aside.

Place a stirring rod into the test tube. Collect the DNA by winding it on the rod by turning the rod in one direction. (This is known as spooling the DNA.)

Carefully, remove the rod and DNA from the solution and transfer it to the test tube containing the 1 mL of ethyl alcohol. Observe the DNA strands floating in the alcohol.

Optional: Use the stirring rod to remove some DNA strands from the alcohol and place them on a microscope slide. View the DNA strands under the microscope. Describe their appearance.

Dispose the 30 mL plastic cups in the trash or as directed by your instructor. Wash test tubes with soapy water or dispose them as directed by your instructor.. Clean up your work area and put materials away as instructed.

## APPLICATION NOTE

Although you will not do anything else with you DNA strands, in a medical or forensics laboratory, the DNA can be further analyzed and studied. In the forensic laboratory, a chemical known as restriction enzymes are added to cut the DNA into fragments. The fragments are then separated by a process called electrophoresis. After separation, the fragments are transferred onto a nylon membrane and then treated with radioactive probes that join with the DNA fragments. That nylon sheet is placed against X-ray film and exposed for several days to produce a DNA fragment pattern that is specific for an individual's identification.

## ACKNOWLEGEMENT

This procedure is based on an activity titled "DNA Isolation Protocol" from the New York Hall of Science, who adapted it from Judy Scheppler at SUNY Stonybrook.