

PLEASE DON'T WRITE ON ME!
How to Extract DNA from a Strawberry



Major Concepts:

Cells are the basic unit of life and make up all plants, animals and bacteria. Deoxyribonucleic acid, or DNA, is the molecule that controls everything that happens in the cell. DNA contains instructions that direct the activities of cells, and ultimately, the body. This activity will demonstrate how DNA can be isolated from a strawberry using common household materials.

Objectives:

- To learn an easy way to extract DNA from a strawberry using household products.
- To see a large sample of DNA

Background:

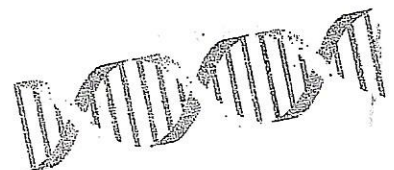
This DNA extraction activity results in a large quantity of DNA that can be seen with the naked eye. Strawberries are a good source of DNA because they are soft and easy to mash, and produce enzymes (pectinases and cellulases), which are chemicals that help in breaking down the cell walls. Strawberries have huge genomes. Humans have two copies of each chromosome (diploid genome). A chromosome is an organized package of DNA found in the nucleus of the cell. Strawberries have up to eight copies of each chromosome (octoploid genome).

Materials (per pair):

- | | | |
|--------------------------------|------------------------------|---------------------------|
| -1 resealable plastic bag | -1 teaspoon salt | -coffee filter |
| -1 strawberry | - $\frac{1}{2}$ cup of water | -ice cold rubbing alcohol |
| -2 teaspoons of dish detergent | -2 plastic cups | -1 popsicle stick |

Procedures:

1. Pull off any green leaves on the strawberry.
2. Put the strawberry into the plastic bag, seal it and GENTLY smash it for about two minutes. Completely crush the strawberry. This starts to break open the cells and release the DNA.
3. In a plastic cup, make your DNA extraction liquid: mix together 2 teaspoons of detergent, 1 teaspoon salt, and $\frac{1}{2}$ cup of water.
4. Add 2 teaspoons of the DNA extraction liquid into the bag with the strawberry. This will further break open the cells.
5. Reseal the bag and gently smash for another minute (AVOID MAKING TOO MANY SOAP BUBBLES!)
6. Place the coffee filter inside the other plastic cup.
7. Open the bag and pour the strawberry liquid into the filter. You can twist the filter just above the liquid and gently squeeze the remaining liquid into the cup.
8. Next, pour down the side of the cup an equal amount of cold rubbing alcohol as there is strawberry liquid. DO NOT MIX OR STIR. You have just isolated the DNA from the rest of the material contained in the cells of the strawberry.
9. Watch for the development of a white cloudy substance (DNA) in the top layer above the strawberry extract layer.
10. Tilt the cup and pick up the DNA using the popsicle stick.



Name: _____

Date: _____

Period _____

Strawberry DNA Extraction Analysis Questions

1. It is important that you understand the steps in the extraction procedure and why each step was necessary. Each step in the procedure aided in isolating the DNA from other cellular materials.

Match the procedure with its function:

PROCEDURE

FUNCTION

A. Filter strawberry mush through coffee filter

___ To precipitate DNA from solution

B. Mash strawberry with salty/soapy solution

___ Separate components of the cell

C. Initial smashing and grinding of strawberry

___ Break open the cells

D. Addition of ethanol to filtered extract

___ To further break up proteins and dissolve cell membranes

2. What did the DNA look like? Relate what you know about the chemical structure what you observed today.

3. Explain what happened in the final step when you added ethanol to your strawberry extract. (Hint: DNA is soluble (can dissolve) in water, but not in ethanol)

4. A person cannot see a single cotton thread 100 feet away, but if you wound thousands of threads together into a rope, it would be visible much further away. Is this statement analogous (similar) to our DNA extraction? Explain.

5. Why is it important for scientists to be able to remove DNA from an organism? List two reasons.

6. Is there DNA in your food? _____ How do you know?