

DNA Extraction Lab: Strawberry

Background: The long, thick fibers of DNA store the information for the functioning of the chemistry of life. DNA is present in every cell of plants and animals. The DNA found in strawberry cells can be extracted using common, everyday materials. Strawberries are soft and easy to pulverize. Strawberries have large genomes; they are octoploid, which means they have eight of each type of chromosome in each cell. Thus, strawberries are an exceptional fruit to use in DNA extraction labs and strawberries yield more DNA than any other fruit (i.e. banana, kiwi, etc.).

We will use an extraction buffer containing salt, to break up protein chains that bind around the nucleic acids, and dish soap which helps to dissolve the phospholipid bilayers of the cell membrane and organelles. This extraction buffer will help provide us access to the DNA inside the cells. DNA is not soluble in alcohol. The colder the alcohol, the less soluble the DNA will be in it. Thus make sure to keep the alcohol in the freezer or on ice.

Materials:

- Heavy duty quart ziploc bag
- Strawberry
- Table salt
- Shampoo (look for sodium lauryl sulfate as a first ingredient)
- Water
- Cheesecloth or similar loose woven fabric
- Funnel
- 50mL vial / test tube or similar container
- 500 mL beaker or mason jar
- Glass rod, popsicle stick, wooden skewer or toothpick
- Chilled (refrigerated or briefly frozen) isopropyl alcohol

Procedure:

1. Gather all materials.
2. Prepare the DNA extraction buffer.

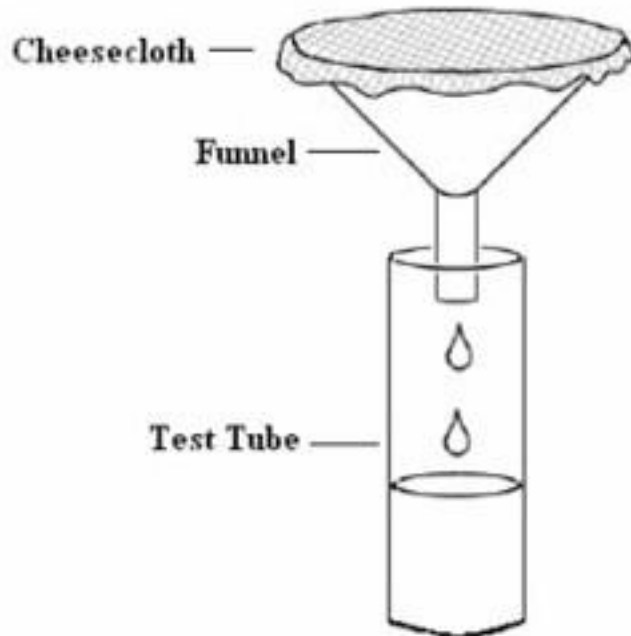
In 500 mL beaker add

- 400mL (1 $\frac{3}{4}$ cups) water
- 50mL (3 Tablespoons + 1 teaspoon) shampoo
- 5mL (2 teaspoons) table salt

Slowly invert the bottle to mix the extraction buffer.

3. Place one strawberry in a Ziploc bag.
4. Smash/grind up the strawberry using your fist and fingers for 2 minutes. Careful not to break the bag!

5. Add 10mL (2 teaspoons) of extraction buffer (salt and soap solution) to the bag.
6. Knead/mush the strawberry in the bag again for 1 minute.
7. Assemble your filtration apparatus as shown to the right.



8. Pour the strawberry slurry into the filtration apparatus and let it drip directly into your test tube.

Caution! From this stage onward, you must be careful not to agitate the mixture.

9. Gently Slowly pour 20mL (1 Tablespoon + 1 teaspoon) cold alcohol down the inside wall of the test tube to form a separate, clear layer on top of the cloudy strawberry mixture below (You should see small wisps of gel-like material forming above the boundary.) **OBSERVE**
10. Dip the glass rod or wooden stick into the tube where the strawberry extract and alcohol layers come into contact with each other. **OBSERVE**
 - a. If the procedure worked really well (it often doesn't) you will get long strands of DNA forming, sometimes more than an inch long! Using the bamboo skewer or toothpick, gently wind up the precipitated DNA.
 - b. As you gently lift the skewer or toothpick out of the container after winding, it will carry long strands of a mucus-like substance that looks like "boogers." That's concentrated DNA, just like they do it on CSI ;-)