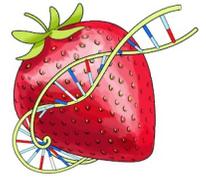


Strawberry DNA Extraction

All living organisms have DNA, which is short for deoxyribonucleic acid; it is the blueprint for everything that happens inside an organism's cells. Overall, DNA tells an organism how to develop and function, and is so important that this complex compound is found in virtually every one of its cells.



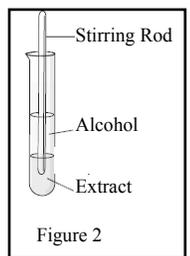
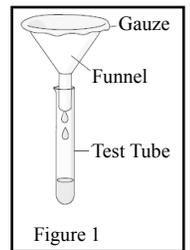
Strawberries are an excellent choice for DNA extraction because they possess enormous genomes. Human cells have two copies of each chromosome, known to be *diploid*. A chromosome is an organized package of DNA found in the nucleus of the cell. Strawberries have up to eight copies of each chromosome, known to be *octoploid*. In addition, ripe strawberries produce two enzymes, pectinases and cellulases, which are chemicals that help in breaking down the cell walls to release DNA.

1. (IOD 303) What is a chromosome?

2. (IOD 303) What two factors make strawberries ideal for DNA extraction?

Directions: Follow the procedure to complete the DNA extraction. Place a check mark on the line preceding each step upon completion.

- Place half of a strawberry into a bag and seal the bag.
- Smash the strawberry with your fingers for 2 minutes. Be careful not to break the bag.
- Add 1 pipette full of extraction solution to the bag.
- Smash again for 1 minute.
- Add 1 pipette full of soapy water to zip-lock bag.
- Smash again for 1 minute.
- Pour the contents of the bag into the filtering apparatus. (See Figure 1) Use your fingers to squeeze as much liquid as possible through the filter and into the test tube.
- Tilt the test tube at a 45 degree angle and pour 1 pipette full of cold rubbing alcohol into the test tube. The rubbing alcohol should form a clear layer above the extract.
- Use the wooden stick to collect the DNA from the layer of alcohol (See Figure 2)
- Swirl the wooden stick in a circular motion to collect the DNA. Observe the color and texture of the DNA while on the wooden stick.



Directions: Complete the analysis questions based on the activity.

3. Describe the appearance of the extracted DNA, including color, shape, and texture.

4. Explain how you were able to see DNA, even though it is normally microscopic.

Name: _____ Date: _____ Period: _____

5. (SIN 301) Match each step of the procedure with its purpose to help isolate the DNA from the other components of the cell.

- | | |
|--|--------------------------------------|
| ___ Break open the cell | a. mix in the soap |
| ___ Dissolve the lipid cell membrane | b. smash the strawberry |
| ___ Precipitate the DNA | c. filter the extract |
| ___ Separate organelles, broken cell walls and membranes from proteins and DNA | d. add cold alcohol to the test tube |

Directions: Complete the questions based on the passage.

A group of students decided to manipulate the DNA extraction activity. They completed each of the following procedures in an attempt to increase the yield of DNA extracted from strawberries.

Trial 1- A strawberry was smashed in a zip-lock bag for 2 minutes. 10 mL of extraction solution was added to the bag and smashed for 1 minute followed by 1 pipette full of soapy water. The liquid was filtered into a test tube and warm alcohol was added to the test tube. DNA was removed and measured to determine the quantity obtained.

Trial 2- A strawberry was smashed in a zip-lock bag for 2 minutes. 10 mL of extraction solution was added to the bag and smashed for 1 minute followed by 1 pipette full of soapy water. The liquid was filtered into a test tube and distilled water was added to the test tube. DNA was removed and measured to determine the quantity obtained.

Trial 3- A strawberry was smashed in a zip-lock bag for 2 minutes. 10 mL of extraction solution was added to the bag and smashed for 1 minute followed by 1 pipette full of soapy water. The liquid was filtered into a test tube and cold alcohol was added to the test tube. DNA was removed and measured to determine the quantity obtained.

6. (SIN 402) In the trials above, what was the independent variable?
- | | |
|----------------------------|--|
| a. amount of strawberries | c. type of soapy water |
| b. amount of DNA extracted | d. temperature of liquid used to extract DNA |
7. (SIN 401) What is the purpose of the independent variable identified in the previous question?
- | | |
|-----------------------------------|--|
| a. to break the cells open | c. to precipitate the DNA into the alcohol |
| b. to dissolve the cell membranes | d. to dissolve the DNA into the solution |
8. (SIN 402) In the trials above, what was the dependent variable?
- | | |
|----------------------------|--|
| a. amount of strawberries | c. type of soapy water |
| b. amount of DNA extracted | d. temperature of liquid used to extract DNA |
9. (SIN 403) Which trial serves as the control?
- | | | |
|------------|------------|------------|
| a. Trial 1 | b. Trial 2 | c. Trial 3 |
|------------|------------|------------|
10. (SIN 404) Which of the following identified the constants in each trial of the experiment?
- | |
|---|
| a. quantity of strawberries, amount of soapy water, time for smashing |
| b. quantity of strawberries, type of liquid used to precipitate DNA, time for smashing |
| c. type of liquid used to precipitate, time for smashing, amount of extraction solution |
| d. amount of extraction solution, amount of soapy water, brand of strawberries |