

Subject- Science

Activity 9 (a)- To extract crude DNA from plant material

Chapter 9 : Heredity and Evolution

Class-X

Duration-40mins

Nature of the Activity- Individual

Learning Outcome- The students will be able to extract crude DNA

What we have to do?

Extract DNA(the molecular unit of heredity) from plant cells

What do we require?

- Ice cold 95% ethanol to be kept night before
- Extraction solution (For 100 ml- 10 ml of clear shampoo / Ezee detergent, 1.5 g of table salt and Distilled H₂O)
- Water heated up to 60°C.
- Ice bucket
- 250 ml Zipper bag with 20 ml of extraction buffer
- Fruit pieces.(Skinned and freshly cut kiwi fruit or one large strawberry)
- 500 ml beaker
- Water bath maintained at 60°C
- Cheese cloth (cut to fit over small beaker)
- Tape
- 1 small test tube
- Transfer pipettes
- 1 wood applicator

What do we need to know?

We will extract DNA from fruit to investigate how it looks and feels.



Figure 1



Figure 2

How will you proceed?

- **Teacher's activity-** Teacher will give the instructions along with the protocol(Student's activity)

Teacher will arrange for the materials (modify amount depending on the size of a class)

- **Student's activity**

1. Mix 90 ml of distilled water and 1.5 g of salt.
2. Add shampoo until solution volume is 100 ml. Stir slowly to avoid foaming of the shampoo.
3. Measure 20 ml of solution into 1L zipper bags (1 per student pair).
4. Add kiwi/strawberry fruit into extraction solution in the zipper bag. Close bag and squeeze out air.
5. Crush the kiwi/strawberry thoroughly for 5 minutes. Be careful, don't break the bag!
6. Place the bags into the hot water bath for about 10-15 minutes, making sure the fruit solution is fully beneath the water line. Occasionally shake the bag to evenly distribute the heat.
7. Move the "mashed" bags of kiwi/strawberry fruit solution into the ice bath for 1 minute. Remove and carefully mix the kiwi/strawberry fruit solution again. Repeat this procedure 5 times.
8. Tape the cheese cloth over the beakers. Filter the fruit mixture through the cheese cloth. Combine solutions from all student groups at this point. Let the solution drain 5 minutes.
9. Using the large transfer pipettes, aliquot approximately 2 ml of the kiwi/strawberry fruit solution into a test tube, one for each pair of students.
10. Add approximately 2 ml of ice-cold ethanol to each tube by dropping it slowly down the side of the test tube, allowing it to rest on top of the kiwi/strawberry fruit mixture. Do not agitate the solution.
11. Let the solution sit for two minutes without disturbing it.

What do we observe?

The DNA will appear as transparent, slimy, white mucus which can be spooled up with the wood applicator stick.

What have I learnt?

1. To extract DNA as in the above activity, from where will you extract it, in case of a plant cell?

2. Draw a flowchart showing the steps of isolation of DNA?

What would I like to know ?

What is DNA used for when it is extracted?

Extended learning

1. Why do we “crush” the kiwi/strawberry fruit?

2. Why do we use shampoo?

3. What does the salt do?

4. Why do we need to cool the mixture?

5. What does the cold ethanol do?

6. Why can't we use room temperature ethanol?

