

DNA Extraction

DNA is a molecule found in the cells of every living thing, including our bodies. It acts as an instruction manual by telling the cells in your body how they should grow, what their job is, and how to work! In this activity you will be doing an experiment, and creating a solution that will allow you to extract DNA from a piece of fruit!

You will need:

- 1 re-sealable plastic bag
- ¼ cup fresh or frozen fruit (strawberries, blueberries, bananas, etc.)- **If you are using frozen fruit make sure it is thawed before doing this activity!**
- 2 tsp liquid dish detergent
- 1 tsp salt
- ½ cup warm water
- 2 clear cups or bowls
- 1 fine strainer or 1 coffee filter (have an extra on hand, just in case!)
- ½ cup **COLD** rubbing alcohol (91% or higher, place in freezer for a few minutes beforehand)
- 1 Popsicle stick, toothpick, or coffee stirrer

Activity – DNA Extraction Experiment



1. Remove any leaves from the fruit.
2. Place fruit into the plastic bag, seal bag up, and **gently** crush/squish/squash the bag! Squish the fruit for about 1 minute, or until most of the lumps are gone.

3. Now you are going to make the solution that will burst the cells in the fruit, releasing the DNA. In a clear bowl or cup, mix: 1 tsp salt, 2 tsp dish detergent, and ¼ cup warm water.
4. Add this solution to the bag with the fruit, reseal the bag, and **gently** squish for another minute. Try to avoid making too many soap bubbles!
5. Place a coffee filter in the second clear bowl or cup. **You may need a second person to help with the next part.**
6. Open the bag and **slowly** pour the fruit mixture in to the coffee filter. Be patient! You might need to wait for some of it to drain before adding the rest of the mixture. Carefully twist the coffee filter and gently squeeze the remaining liquid in to the cup.
7. Tilt the cup and **slowly** pour cold rubbing alcohol down the side. Add as much rubbing alcohol as there is fruit solution.
DO NOT MIX OR STIR!
8. You will see two layers form in the cup. The top layer is the rubbing alcohol and the bottom layer is the solution you filtered the lumps of fruit from.
Watch for a cloudy substance to form in the top layer – **that is the DNA you have extracted from the fruit!**
9. After a couple of minutes, use your popsicle stick and pick up the DNA. It is safe to touch with your hands but do **not** eat it. Wash your hands well after!
10. All liquids can be disposed of down the sink.

DNA Extraction- How does it work?

- The salt + dish soap + water solution bursts the cells in the fruit, which releases the DNA in to the mixture. Mashing the fruit beforehand helps expose more of the fruit cells to the cell-bursting solution!
- Dish soap can cut through fats + oils – something we call lipids. The cell membrane (the outside of a cell) and the nucleus (part inside the cell that holds the DNA) are made up of lipids, which break open when they interact with the dish soap, releasing the DNA!
- The salt helps the DNA strands stick together in clumps that can be seen with the naked-eye.
- Filtering the mixture separates the fruit lumps from the DNA-solution. This makes it easier to see the DNA when the alcohol is added.
- DNA is not soluble (does not dissolve) in alcohol, especially with the salt that was added. When the cold alcohol is added to the fruit solution the DNA *precipitates* out (clumps together) so we see it as a slimy, cloudy solid.
- Molecules are more soluble (dissolve better) when they are at higher temperatures. We use **cold** rubbing alcohol to help more DNA precipitate out of the solution.

Where to learn more!

If you would like to learn more about DNA, some interesting facts, or do another fun activity, check out the links below.

- **Activity link:** Create a gene bracelet based on your own traits!
<https://www.pragmaticmom.com/wp-content/uploads/2017/10/Gene-Bracelet-Activity-Guide-printable.pdf>
- **Video link:** For a really easy explanation of DNA, check out this video!
<https://www.youtube.com/watch?v=BK0lxUpppvE>