

Exp #09: DNA Capture

Introductory Chemistry

Name: _____

Student ID: _____

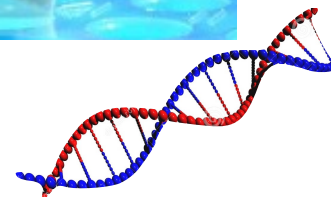
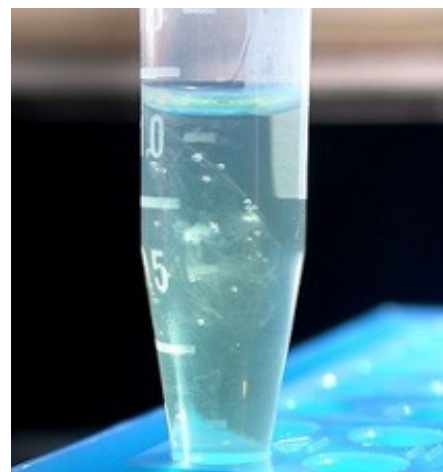
Chem 10 — De Anza College

Objective

- Isolate DNA molecules from fruit paste.
- Observe DNA and describe the appearance of DNA.

Discussion: Methane is composed of 5 atoms. Sugar is made from 45. Organic molecules can get much larger. Hemoglobin is made of over 7000 atoms and some proteins are composed of half a million atoms. The largest molecule synthesized by humans has over 200 million atoms connected in detailed patterns that produce amazing new functionality. The intricacies of cars, airplanes, computers, and other macroscopic machines have never approached the complex interworking of molecular machines. DNA molecules are a thousand times larger than the biggest molecule we have ever built. A human DNA molecule stretched out would be six feet long and contains more than 200 billion atoms. That is thirty times the population of earth.

DNA is such a large molecule that if carefully extracted it is visible to the human eye. In this experiment, you will attempt to extract and observe DNA molecules and describe your observations.



Equipment

- Molecular Model Kit.

Procedure:

Part A — Preparation of the extraction solution.

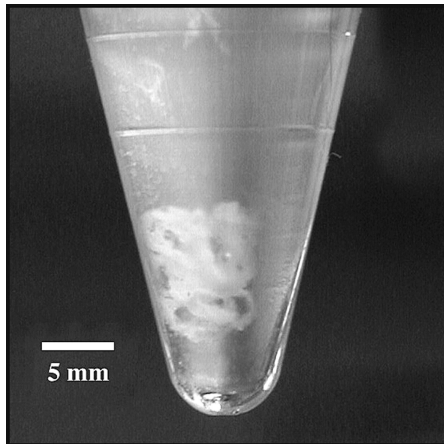
1. Prepare an ice bath by filling the 400 mL beaker about one fourth full with ice and adding about 200 mL of tap water.
2. In a 250 mL Erlenmeyer flask prepare a homogenous mixture of:
 1. 1.5 grams of sodium chloride
 2. 5.0 grams of sodium bicarbonate (sodium hydrogen carbonate; NaHCO_3)
 3. 5 mL of laundry detergent
 4. 120 mL of deionized water
3. After the Erlenmeyer solution is completely dissolved, chill it by placing the Erlenmeyer flask in the ice bath for approximately 5 minutes.
4. Collect 10 mL of *iso*-propyl alcohol in a 10 mL graduated cylinder. Place the cylinder in the ice bath.
5. Collect about 10 mL of the fruit paste in a 50 mL beaker.

Part B — Extraction of DNA

6. Add 20 mL of your extraction solution to the 50 mL beaker containing the fruit paste.
7. Stir the extraction solution into the paste vigorously for about 2 minutes.
8. Allow the heterogeneous mixture of fruit paste and extraction solution to settle (this should take a few minutes).
9. Using a pipet (eye dropper) carefully transfer the clear liquid from your 50 mL beaker to a 100 mL graduated cylinder. Be careful not to disturb the settled solid at the bottom of the beaker.

Part C — Precipitation of DNA

10. With a clean pipet, gently add 10 mL of chilled iso-propyl alcohol to the DNA solution in your 100 mL graduated cylinder. Tilt the graduated cylinder, place drops of the isopropyl alcohol on the side of the cylinder and allow them to gently run to the top of the extraction solution.
11. If added gently the iso-propyl solution will form a separate phase on top of the water, a bilayer of alcohol over water.
12. Move the tip of the pipet to just below the surface of the bottom layer and slowly stir the lower solution, lifting it into the alcohol phase.
13. Watch the solution carefully, record your observations.



Conclusion:

•Describe the DNA molecule you revealed. There are no calculations for this experiment.

Exp # _____

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Chem 10 – *Intro Chem*
De Anza College

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Class Section: _____

Experiment Title: _____

Unk#: _____

Bench / Locker : _____ / _____

(write N/A if no unknown for this experiment)

This box is for use by your instructor.

Unknown Composition or Identity:



A report must be submitted for all lab experiments conducted to receive credit for your participation. You may only report on experiments you conducted.

Reminder: All experiment reports should include each of the following sections. Each section should start on a new page and be clearly labeled.

- ➔ COVER PAGE (this page)
- ➔ 1. PRE-LAB
 - ➔ Describe the objectives of this experiment (what you hope to conclude).
 - ➔ Any pre-lab questions must be considered and answered before the start of the lab period. Your instructor will initial those pages and they must be included in your lab report to receive full credit for them.
 - ➔ If there is a pre-lab quiz it will be graded and returned to you during that lab period. It should be attached to your report to ensure you receive full credit.
- ➔ 2. DATA
 - ➔ Empirical data, only what you observed and others could if they repeated your experiment. Observations both qualitative and quantitative (measurements).
- ➔ 3. ANALYSIS (CALCULATIONS)
 - ➔ Provide demonstrations (justification) of how your conclusions were developed from your observations. Most often accomplished with dimensional analysis or algebra (calculations). For some experiments other methods will be demonstrated and need to be applied.
 - ➔ It is only “known” if it can be justified ... otherwise it’s a guess.
- ➔ 4. CONCLUSIONS
 - ➔ Your final answers. What you came to know by doing this experiment. Be clear and brief, conclusions should not be more than one page and are often only a few sentences.
 - ➔ If other factors effected your final answer, briefly describe them on this page and suggest how they may have effected your experiment.
- ➔ 5. QUESTIONS
 - ➔ Attach and answer any post lab questions.