**Biology CP** **Name: _____**

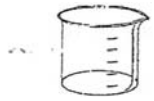
**The Race for the Most Double Helix!** **Per: _____ Date: _____**

In this lab, you will extract or "spool" DNA from strawberry cells. Most of the unusual properties of DNA result from it being such a long thin molecule. Each cell contains approximately six feet of very thin DNA. Ripe strawberries are producing pectinases and cellulases that are already breaking down the cell walls. Most interestingly, strawberries have *enormous* genomes. They are octoploid, which means they have eight of each type of chromosome. The detergent we will be using to homogenize the strawberry helps to dissolve the phospholipid bilayers of the cell membrane and organelles. The salt helps to keep the proteins in the extract layer so they aren't precipitated with the DNA. DNA is not soluble in ethanol. When molecules are soluble, they are dispersed in the solution and are therefore not visible. When molecules are insoluble, they clump together and become visible. The colder the ethanol, the less soluble the DNA will be in it. This is why it is important for the ethanol to be kept in the freezer or in an ice bath.

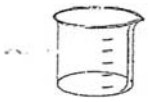
- ✓ A homogenization solution containing detergent will be used to help break open the cell walls and membranes so that the cells will "spill" out their DNA... among other things.
- ✓ An NaCl solution will be used to help remove proteins from your mixture as well as to "neutralize" the DNA.

**Solutions & Materials for EACH TABLE:**

60mL homogenization solution



25mL NaCl solution



60mL cold ethyl alcohol (Obtain when needed)

One Strawberry

One disposable pipet

One mortar & pestle

One weigh boat

One glass stirring rod hook

**Procedure:**

1. Using the electronic scale, weigh your strawberry and record data.
2. Weigh the weigh boat and record data.
3. Pour 25 mL of the homogenization solution into the mortar.
4. Add the strawberry (pinch off stem) into the mortar, and carefully grind it with a pestle.
5. After grinding, add another 25 mL of homogenization solution to the ground strawberry.
6. Using the pestle, slowly stir the ground strawberry for 5-10 minutes.
7. Place a double layer of cheesecloth in a funnel and strain the homogenate (ground strawberry) through the filter into a clean medium-sized beaker.
8. To the filtrate (the stuff you just collected in the beaker) add enough NaCl solution to increase the volume of the filtrate by 1/4. In another words, if you have 40 mL of filtrate, add 10 mL of the salt solution. Gently mix the solution.

9. Pour about 25 mL of the strawberry filtrate (from step 6) into, a clean medium-sized beaker. Using a pipette, GENTLY add 15-20 mL of ethyl a1cohol to the side of the beaker so that it forms a layer on top of the filtrate.
10. ***You will begin to see cloudy strands forming at the boundary of the alcohol and the f1ltrate. These cloudy strands are DNA!!!***
11. Spool the DNA by using the glass stirring rods. Gently dip the end of the stirring rod down through the alcohol and into the strawberry f1ltrate. Try to fish out the strands of DNA by twirling them around the glass rod. Be sure to twirl in ONE DIRECTION ONLY.
12. Place DNA strands into the weigh boat.
13. Once you have extracted all of your DNA, bring boat of DNA to scale, weigh and record data.
14. Calculate net DNA extraction and record.

**Data:**

Fresh strawberry: _____ grams

Weigh boat: _____ grams

DNA plus weigh boat: _____ grams

NET DNA: _____ grams

% DNA extraction: _____

$$\frac{\text{Net DNA}}{\text{Fresh Strawberry}} \times 100$$

**Questions:**

1. In the first 6 steps of the lab, you were isolating the DNA molecules from the strawberry cells. What type of organic molecules were you purifying the DNA from?

2. Describe the appearance of the DNA that you spooled out.

3. Name the 4 traits that DNA must possess since it is the genetic material of our cells.

   1. _____
   2. _____
   3. _____
   4. _____

4. Name 4 traits of DNA structure.

   1. _____
   2. _____
   3. _____
   4. _____