Sci 9 **DNA Extraction Lab**  Name:

**Introduction:** DNA is found in the nucleus of all living cells. DNA is a long molecule in the shape of a double helix and normally exists in a thin, stringy mass called chromatin. A single molecule would be too small to be seen with the naked eye. But if we gather enough of it, it can become visible without a microscope. Like a single thread compared to a spool.

Although DNA can be found in all plants, strawberries are a good to use as it has 8 sets of DNA (octoploid). Bananas and kiwi also work but yield less. To extract the DNA, we must first break up the cells to free the DNA from the nucleus. Once the cells are disrupted the various cell debris such as organelles, cell wall, and other proteins must be filtered out. Detergent (soap) will dissolve the fats within the cell membrane. Salt will keep the proteins in the extract layer so they aren’t precipitated with the DNA. DNA is not soluble in alcohol so it will precipitate out (come out of solution) when the iso-propanol is added. The colder the alcohol the less soluble the DNA will be. The DNA is sticky and will clump up when it comes out of solution.

Scientists study DNA of organisms to compare their DNA of those that are resistant to disease.

**Materials:**

Fruit Medium test tube 0.9% Salt solution

Sandwich bag Cheese cloth dish soap solution

100mL Beaker glass stir rod ice cold isopropanol

**Procedure:**

1. Place one strawberry in a sandwich bag. Mash gently with your hands.
2. Using a graduated cylinder, measure 10ml salt solution. Pour into bag. Mix gently.
3. Use a graduated cylinder to measure 2ml of dish soap solution. Add to the bag.
4. With one partner holding a double layer of cheese cloth over the mouth of a beaker, the other partner pours berry solution onto the top of the cloth.
5. Mash gently with your clean fingers to push the liquid portion through the cheese cloth, leaving chunks on top.
6. Dispose of cheesecloth/strawberry chunks into compost/garbage.
7. Pour contents of beaker into test tube.
8. Using a graduated cylinder, measure 2ml ice cold isopropanol. **Tilt the test tube** and gently pour the isopropanol down the side so it **layers ON TOP** of the berry juice in the test tube. Wait 2-3 minutes.
9. You should start to notice a white substance forming where the two layers meet. This is the DNA **precipitating** out of solution.
10. Carefully insert a glass stir rod and gently swirl it in the top layer. You should be able to pull out a clump of DNA.
11. Make your observations. Clean up and put everything away.

**Questions:**

1. The DNA appeared as a white solid, called a precipitate, when it came in contact with the isopropanol. What *physical property* of DNA does this step in the procedure depend on?
2. Do you think the process of isolating DNA would be very different if you were to use a vegetable, animal cells, or a different fruit? Explain why or why not.
3. A person cannot see a single cotton thread 100m away, but if you wound thousands of threads together into a rope, it would be visible at some distance. How is this statement an analogy to your DNA extraction?
4. List two reasons a scientist might want to study the DNA of strawberries or other organisms.
5. If you wanted to extract DNA from a living person, what cells would you use and why?

**Evaluating the procedure**

1. What is the purpose of mashing the strawberries?
2. What was the purpose of the extraction buffer (salt solution)? (Reread the intro)
3. Cell membranes contain lipids (fats). Soaps interact with and disrupt cell membranes. Why is it necessary to disrupt the cell membranes in this investigation?
4. Why is it necessary to filter the mashed berry?