DNA Extraction Lab

**Purpose:** To extract DNA from a sample of split peas.

**Materials:**
- 3 cups of cold ice water
- glass stir stick
- test tubes
- split peas (about 1½ cups)
- wooden splints
- blender
- 2 - 1000 ml beakers
- 90 ml of dish soap
- tape and marker
- ½ teaspoon salt
- meat tenderizer
- strainer
- ice water in a beaker
- cold isopropyl alcohol

**Method:**

**Step 1:** Place split peas in the blender. Add 3 cups of ice cold water and the ½ teaspoon of salt. Cover and turn the blender onto a high setting for about 15 seconds.

**Step 2:** Place the strainer over the beaker. Pour the mixture from the blender into the strainer – don’t worry about getting all of it. Add the 90 ml of detergent and mix gently (don’t make bubbles). Let the mixture stand for about 10 minutes. Longer times are better.

**Step 3:** Each student group (2 or 3 maximum) should have a test tube. Make sure the test tube has a name on it. Place the test tube in a beaker of ice water when not being used. Pour some of the mixture into the test tube so it is about ¼ full. Add a pinch of meat tenderizer to the test tube and mix carefully using the finger method. Wait 2 – 3 minutes.

**Step 4:** Tilting the test tube at an angle, add a small amount of isopropyl alcohol (25 – 50 ml) carefully down the side so it forms a layer on top of the water. Do not mix it up. Let is stand for a bit and look at the boundary between the water/pea mixture and the alcohol. You should see some fine white stringy material. You can help it along by putting the wooden splint into the water layer and bringing up material into the alcohol layer.

**Step 5:** Use the wooden stick to pull some of the white stringy material out of the test tube. This is DNA (mixed with some RNA). Congratulations! You have isolated DNA from the cell.

**Results:**
In the empty box above, draw the test tube and label the following layers:

- water / pea mixture
- isopropyl alcohol
- DNA strands

**Discussion:** Answer the questions below. You will have to get your answers off the web.

1. Using cold water was an important part of the experiment. It has to do with lysosomes.
   a) Define what a **lysosome** is:

________________________________________________________

Do your drawing here
b) What kinds of enzymes do lysosomes have in them? Name two. ____________________________
________________________________________________________________________________

c) How does the cold water affect the action of the lysosomes’ enzymes in the solution?
________________________________________________________________________________

2. Using detergent was also an important part of the experiment. It has to do with fats.
a) What is a fat molecule made of (it has two parts; describe both parts): ______________________
________________________________________________________________________________

b) Detergents act as an emulsifier. Define the word **emulsify**.  ______________________________
________________________________________________________________________________

c) What parts of the cell are made mostly of fats? ________________________________________
d) How then does the detergent help to separate the DNA from the rest of the cell components?
________________________________________________________________________________

3. Meat tenderizer is also used; it has to do with proteins. It breaks down histones in the chromatin.
a) What are proteins? _________________________________________________________________

b) What is a peptide bond? __________________________________________________________

c) How does the meat tenderizer affect proteins? Be specific. ______________________________
________________________________________________________________________________

d) Name two enzymes commonly used in meat tenderizers. ________________________________
e) These enzymes are commonly found in certain fruits. Name two fruits which are common sources of the enzymes mentioned. _____________________________________________

f) Look up chromatin on the web. Draw a picture of a long strand of DNA which is folded up into chromatin using histones. **Label**: DNA, chromatin, histone proteins.

4. Isopropyl alcohol is a poison, but in the lab it helps to **precipitate** the DNA strands. Define the term precipitate in the space below.
________________________________________________________________________________
________________________________________________________________________________

Conclusion: Write a few sentences about what you did and how you did it.
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