

Biochemistry Lesson Plans for use in a Biology classroom

An Introduction to Four Groups of Biologically Important Compounds

Objectives

After successfully completing the following lessons, the students will:

- be able to identify the four major groups of biochemicals as well as know specific information about each group
- know how to test for the presence of different groups for carbohydrates
- understand how enzymes work and their importance in a living system
- be able to give examples of enzymatic activity and the denaturing of proteins
- extract DNA from food samples

These lessons were created as primarily notes and demonstrations with the goal of acquainting the students with lipids, carbohydrates, proteins/enzymes and nucleic acids. If more time is available, the students could be assigned to perform the demos as mini-labs or as "station labs" where they rotate to perform the different tests themselves.

Overview

Day 1: Give notes using the "4 groups" chart. As I cover each biochemical group, I will do demonstrations that pertain to that group.

Day 2: Continue with notes and demos

Day 3: Finish demos from day 2, review and then quiz.

Day 1 Carbohydrates and Lipids

Give notes to students using the attached chart to help them organize the information. Instead of just filling the chart out for them, I would allow them to do some exploring for them selves using their background knowledge and their books to help them get started.

For each of the 4 groups, I would perform the following demonstrations with the assistance of a few volunteers from the classroom. I would hope to get through 2 of the groups a day, but I have taught long enough to know that this is probably not realistic.

Carbohydrates demos:

- iodine test for starch on various foods including minutes rice vs. whole grain rice...why the difference?, chewed potato vs. non chewed potato for starch...wait 5 min and then 10 and test the chewed again for a color test, etc..
- testing for sugars using Benedict's solution
- taste tests of different mono and disaccharides

Lipids demos:

- different foods on brown paper bags...let sit so kids can see the amount of fat absorbed at the end of the period or the next day
- insulation value of fats...put shortening in-between layers of two bread sacks, let student put one hand into bread sack and have them put both of their hands into ice water in a large cooler.

Day 2 Proteins and Nucleic Acids

Cover proteins and nucleic acids on the chart, give notes over enzymes (attached) and do the following demonstrations. (Some of this will clearly need to run over to day 3)

Protein demos: (we will focus on specific type of proteins called enzymes)

- cracker in saliva...starch-→sugar via enzyme activity
- at their desks pass out a container with pre cut equal size pieces of bread. Have students take 2 of them. Put one piece in mouth and chew until very mushy...spit it onto piece of wax paper on desk. Put the "unchewed" piece of bread next to it and add 4 drops of iodine to each.
- Gelatin with fresh vs. canned pineapple
- Gelatin with meat tenderizer (discuss action of papase on connective tissue in meat)
- show enzymatic activity of catalase in liver as it breaks hydrogen peroxide into water and oxygen. Just pour hydrogen peroxide into test tube with fresh liver in it
- demonstrate how proteins are denatured by cooking an egg, heating pineapple juice, cooking liver and adding hydrogen peroxide

Nucleic acids demos:

- DNA extraction from foods (directions attached)

Day 3 Assessment

Finish any demonstrations and /or information that did not get covered on day two and if time give a quiz (attached)