

Amino Acids

Summary

Scientific principles in using eggs as a highly nutritious and versatile food source of protein.

Main Core Tie

Food Science

[Strand 7 Standard 4](#)

Background for Teachers

Approximately one-half of the nonwater mass of the human body is protein. Proteins compose some structural parts of the body such as cartilage and tendons. Protein will be discussed here, using eggs because the white of the egg gives such visibility to protein reaction in food preparation.

One-half of the protein in the body, however, is used as catalysts within the cells. These catalysts, you will recall, are called enzymes. Enzymes, then, are proteins. (See FOOD AS MATTER, Section 2-1.)

Body cells require energy. The body makes enzymes from protein, but it eats its own protein only during starvation. Enzymes allow energy-producing reactions to occur within the cells without raising temperatures so high that the energy-producing reactions would injure the cells. Some of the energy produced does appear as heat in the cell, but most is used to produce other products whose synthesis requires input of energy. If all the energy were kept in the cell in the form of heat, the cell would die.

Proteins are type of molecule found in all animals and plants. Like polysaccharide, proteins are polymers. They are very large molecules because each protein molecule is made up of smaller molecules called amino acids. The amino acids form proteins by linking into long chains called polymers. When human beings eat proteins, the body breaks them apart and uses the amino acids to build new proteins necessary for growth and repair of body tissues.

Intended Learning Outcomes

Proteins from animal sources are complete proteins because they contain all of the amino acids the human body needs. Eggs are a primary source of complete protein and have unique physical and chemical properties that illustrate the nature of the protein molecule.

Instructional Procedures

See attachments below:

The students will work with a PREASSESSMENT called BILL THE CHEF to determine what they know about the behavior of egg proteins in meal preparation.

The students will cut out puzzle pieces provided in PROTEIN MATCH GAME and put them together to form complete proteins. The teacher will then use the list of Nonmeat Protein Sources to help the students visualize the amino acid profile of plant vs. animal foods.

The students will listen and take notes in their science notebook while the teacher discusses egg white foams. The discussion should include:

1. The definition of egg white foam.
2. The characteristics of a stable egg white foam.
3. The effects of added substances and beating time on the stability of egg white foams.

The students will do EGG FUNCTIONS SORT to reinforce their learning about the functions of eggs.

The students will prepare of and participate in a FOOD SCIENCE LAB (EGG WHITE FOAM EXPERIMENT). Each unit will prepare one of the egg white foams and label their foam before bring it

to the demonstration table at the front of the room. After each unit has completed the assigned task, the teacher will review the lab activities with the class.

The students will complete their EGG WHITE FOAM LAB EVALUATION study sheet while the teacher discusses the lab results and the class draws conclusions about the stability of egg white foams.

The study sheet and worksheets may be included in the student's science notebook.

The students will participate in a lab experience in which eggs are used as a binder, leavening agent, and emulsifying ingredient. (See EGGS AS A BINDER, A LEAVENING AGENT, AND AN EMULSIFIER - RECIPES.)

The objective of this lab is to have the students:

- a. Discover how to use eggs as a binder. (Meat Balls and Tropical Sherbet)
- b. Examine the principles of using eggs as leavening agents. (angel Food Cake).
- c. Identify the emulsifying property of eggs. (Mayonnaise)

The teacher will assign each group a different task as outlined on the recipe sheet.

The students will evaluate their lab experience by completing the questions found on the resource: EGGS AS A BINDER, A LEAVENING AGENT, AND AN EMULSIFIER - REVIEW QUESTIONS as the teacher leads the students in a discussion to explain the principles shown in the lab experience.

Using the recipe, LEMON MERINGUE PUDDING CUPS, the students will prepare for and participate in a lab which will include:

- a. Using eggs as a thickener by making lemon pie filling
- b. Using egg whites as a foam by making meringue

NOTE TO TEACHER: Review the techniques for using eggs to thicken sauces and puddings and for making a stable egg white foam. The objective of this lab is to have the students use the correct technique for using an egg as a thickener and also to use the correct technique to make an egg white foam.

The students will participate in a review by completing PROTEIN AND EGG: TRUE OR FALSE STATEMENTS.

As a SUMMATIVE EVALUATION, the students will study the recipe ALBESKIVERS and answer the questions on the scientific principles involved.

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