Fun with Vegetables Inquiry Lab

Summary

This is an inquiry lab investigating the function of enzymes and variables that influence them. Students will also practice designing a lab and writing a hypothesis.

Time Frame

2 class periods of 60 minutes each

Group Size

Small Groups

Materials

- student sheet
  (attached)
- overhead of lab set up
  (attached)
  variety of vegetables (potatoes, carrots, turnips, beets)
  blender or juicer
  hydrogen peroxide
  ring stand and clamp
  test tube with one-hole stopper
  short piece of glass tubing
  50 ml graduated cylinder
  rubber tubing
  large 600 ml beaker or water trough
  pipettes
  teaspoons
  10 ml graduated cylinder
  goggles

You may also want to have the following supplies available for students:

vinegar (or other acid)
bleach (or other base)
ph paper
ice
thermometers
500 ml beaker for water bath
alcohol burner

Background for Teachers

Time Needed:
2 ½ 50 minute class periods
Lab Design:

Student Prior Knowledge

Students should understand what enzymes and catalysts are. They should also be familiar with designing an inquiry lab.

Instructional Procedures

The Day Before:

Pass out student sheet to students.
Put up overhead of lab setup.
Let students complete background information.
Allow students to figure out how the lab set up will work.
Have students design their lab. I do not let any 2 groups perform the same experiment.
As students design their hypotheses have them write them on the overhead so that students know which ideas are being used.

The Morning Of: (vegetables do not work as well the next day!)

Obtain various vegetables (for 70 students I use 2 small potatoes, 3 large carrots, 2 beets and 1 large turnip).
Cut each specimen into pieces and place in blender or juicer.
Juice/blend each vegetable, do this as fine as possible (I use a blender and don't strain and things always seem to work fine).
Plan on about 30 minutes of prep time with a standard blender.

In Class:

Have students set up lab apparatus.
Remind them that the control must be done also.
Check off set up before students begin.
Allow students time to do lab, this will take the full class period and I prefer them to do several trials, so testing may run into the next day.
Each table should present their conclusions to the class.

Assessment Plan

Sample Scoring Guide:

Prelab (Background-Procedures).....18 points
Quantitative data.....10 points
Qualitative data.....10 points
Questions correctly answered.....24 points
Graph drawn correctly.....5 points
Analysis questions.....12 points
Conclusions are complete, solid ideas in complete sentences.....20 points

Answers to Analysis Questions:

answers will vary
Adding more enzyme should not increase the amount of product if the amount of reactants stays the same
Heat sped up the reaction to a point, however when the temperature becomes too hot the enzyme or protein loses its shape and will not function
Whichever vegetable produced the most product (oxygen gas)

Answers to Conclusions:

Answers will vary
So you can attribute your results to the variable, if there are 2 you can't tell which is influencing your results
It is important so that you can tell verify your results and have some accuracy
Answers will vary

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

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