CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22293

Project Title
Inventing Glow-in-the-Dark Bubble Gum. Step One: Making It Glow

Abstract

Objectives/Goals
The ultimate goal, which spawned this project, is to invent glow-in-the-dark bubble gum. The first step, and thereby the project objective was to examine which of the following luminescent substances will be the least harmful to yeast cells: phosphorescent, chemoluminescent or fluorescent.

Methods/Materials
To find the prime growing conditions for yeast to serve as a control in the trials, a set of temperatures and different amounts of sugar, and water were tested. The substances were tested on yeast cells because yeast cells are a lot like human cells: both perform respiration. Fluorescence was eliminated from the experiments when literature research revealed that fluorescent substances require a constant source of energy in order to glow. The luminescent materials Zinc Sulfide (ZnS) and Luminol, from the categories of phosphorescence and chemoluminescence respectively, were exposed to yeast at prime conditions. Four trials (two for each luminescent material) were compared with the control to find whether or not the yeast was harmed when exposed to ZnS or Luminol.

Results
The control batch of yeast, the same for both sets of experiments, rose only 45 ml. The batches of yeast with luminol, the chemoluminescent substance, rose an average of 110 ml. The batches of yeast with ZnS, the phosphorescent substance, rose an average of 60 ml. In the experiment, the yeast with chemoluminescent materials rose the most. This should mean that the yeast benefited from it the most. However, my theory is that the chemicals reacted with the sugar in the yeast solution and foamed more for that reason.

Conclusions/Discussion
Of the chemicals tested in this project, the phosphorescent substance, ZnS, was the safest in its effect on the yeast, and could be the best for making glow-in-the-dark gum. Additional experiments should be performed to fully support this conclusion. It would be necessary to study the reaction of chemoluminescence in the presence of yeast and sugar to find out if this reaction results in the production of carbon dioxide. This will be the subject of further research.

Summary Statement
This project was done in order to find the safest luminescent material for glow-in-the-dark bubble gum.

Help Received
Olga Issakova, PhD, let me work in the lab of her company, Nanosyn, to perform the experiments, helped obtain the chemicals, and taught me about chemistry and the basics of the experiment. My mom and dad advised me on my board and edited my project. Gary Abrams at FUNWORLD told me the ingredients of