

Name _____ Date: _____ Class Period: _____

Simulation of Irradiation

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One of the newest methods of food preservation, irradiation, uses a radioactive source to produce beta particles and gamma rays. When food is exposed to this radiation, bacteria, which cause food to spoil and produce disease, can be destroyed. The radiation will also destroy insects and larvae that can contaminate foods. Irradiation is a somewhat controversial method of food preservation. Some people fear the effects of the radiation on foods: others are opposed to the increased number of sites that use radiation.

Since radioactive materials are not safe to handle, we will simulate the effects of irradiation by using ultraviolet light instead of the beta and gamma radiation. Both gamma rays and UV light are types of electromagnetic radiation. In this lab, you will try to determine the effects of this radiation on bacteria growth.

Procedure:

1. Obtain five petri dishes that contain nutrient agar.
2. Label dishes as A, B, C, D, or E.
3. Using a cotton swab, streak each plate in two directions with either *Serratia marcescens* or *Bacillus subtilis*. (CAUTION – be careful to lift lid only slightly and replace quickly to avoid airborne contaminants.) Replace the lid.
4. Incubate **dish A** in the dark at 22°C. Incubate **dish B** with the lights on at 22°C.
5. For the remaining dishes, place each plate directly under ultraviolet light – about 5 cm away from the light = with the cover off and agar side up. (WARNING: Do not look directly at UV light!)

Plate C should be exposed for 10 seconds and put in an incubator at 22°C in the dark.

Plate D is to be exposed for 10 seconds and incubated at 22°C in the light.

Plate E should be exposed for 40 seconds and placed in a dark incubator at 22°C.

6. Examine the dishes the following day. Record your results. (CAUTION. On both days, make sure your work area has been washed down with ethyl alcohol. Plates should be returned to your teacher for proper disposal at the end of this experiment. Do not touch your face or hair while working with bacteria. Wash your hand thoroughly when finished.)

Data Table: Simulation of Irradiation

<u>Plate</u>	<u>Description of Growth</u>
A	
B	
C	
D	
E	

Clean Up Instructions:

Questions:

1. What was the main difference between the control plates (A, B) and the experimental plates (C, D, and E)?
2. Which set of conditions produced the greatest amount of bacteria? The least amount? Why?
3. Based on your observations, do you think that using radiation is an effective method for protecting food from bacterial growth? Justify your response.

4. How is UV light used in this lab similar to the radiation used to irradiate foods? How is it different?

ASSESSMENT

Choose one of the following:

A. You are the new purchasing manager for Super Burger, and international chain of hamburger franchises with over 17 Billion dollars in annual sales. The executive committee is meeting next week to consider the decision of whether or not to use irradiated meat – either for all or part of your product. Based on the enclosed reports from marketing and legal departments, what would your recommendations to the committee be? Submit a one-page summary of your decision for review by the company executives.

B. You are head of a consumer watchdog organization. Write a one page brief for your organizations web site either in support or in opposition to the irradiation of food.

NOTE: All assessment writings will be judged by the following criteria:

Uses appropriate concepts correctly

Uses appropriate vocabulary

Writing is organized and focused

Writing is thoughtful

Appropriate information is used to support concept

Language mechanics are correct, and in the proper style

References, if needed, are properly made

Writing is neat and presentable