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Catalog No. AP9080
Publication No. 9080

Glowing Germ

Fluorescent Lotion

Introduction

Show students how easily germs can spread and emphasize the importance of good hygiene in the lab.

Concepts

- Fluorescence
- Ultraviolet light
- Laboratory hygiene

Materials

Glowing Germ fluorescent lotion

Ultraviolet light source

Safety Precautions

Glowing Germ is a consumer product with minimal safety hazards. May cause irritation to individuals with extremely sensitive skin. Exercise caution as with all chemicals in the lab. Students should always wear chemical splash goggles in the lab.

Procedure

1. Before students arrive for class, place a small amount of the Glowing Germ fluorescent lotion on something in the lab that many students will touch, such as the stapler or the door knob.
2. Conduct the class or lab session as usual until just before the end of class.
3. Turn off the classroom lights and turn on one or more ultraviolet lights in the room. The Glowing Germ will glow bright bluish-white under the ultraviolet light, appearing as bright white spots. Students will be amazed at how "contaminated" the lab or classroom is.

Disposal

Dispose of the empty bottle in a solid waste receptacle.

Tips

- This demonstration can be done at the beginning of the school year to illustrate why eating or drinking in a lab setting should not be allowed and why students should always wash their hands before leaving the lab.
- The demonstration is also very applicable in biology courses to illustrate the spread of bacteria and other microorganisms. Students are much more likely to follow directions concerning sterile techniques after seeing this demonstration.
- Glowing Germ fluorescent lotion is a product that has an oil base and contains fluorescent dyes. It is used by many health care educators, hospitals, food preparation industries, and other facilities where hygiene and public health are an issue. The product can be used in many creative ways, including forensic studies. Encourage students to develop new uses and activities using the lotion.
- The Glowing Germ lotion comes in a 240-mL pump-type bottle for ease of use. Depending on how much lotion is used each time, there should be enough lotion to perform the demonstration at least seven times.

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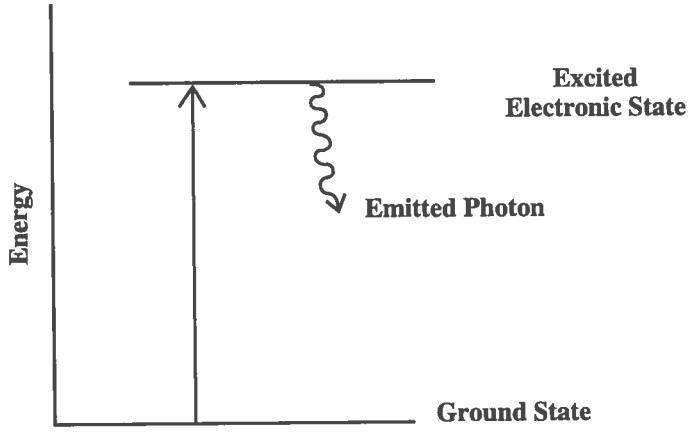
- An optional worksheet is included to help students better understand the demonstration and provide you with an assessment tool.

Discussion

Luminescence is the emission of radiation (light) by a substance as a result of absorption of energy from photons, charged particles, or chemical change. It is a general term that includes fluorescence, phosphorescence, and chemiluminescence, to name just a few special types. Fluorescence is different from other types of luminescence in that is it restricted to phenomena in which the time interval between absorption and emission of energy is extremely short. Therefore, fluorescence only occurs in the presence of the exciting source. This is different from phosphorescence, which continues after the exciting source has been removed. In this demonstration, the exciting source is the ultraviolet "black" light.

In fluorescence, when a light source is shined on a material, a photon is absorbed. The energy from the photon is transferred to an electron that makes a transition to an excited electronic state. From this excited electronic state, the electron naturally wants to relax back down to the ground state. When it relaxes back down to the ground state, it emits a photon (symbolized by the squiggly arrow in the diagram below). This relaxation may occur in a single step or in a series of steps. If it occurs in a single step, the emitted photon will be the same wavelength as the exciting photon. If the relaxation occurs in a series of steps emitting a photon along the way, the emitted photon will have a greater wavelength (lower energy) than the exciting photon.

Energy Level Diagram



If the emitted photon's wavelength is in the visible portion of the spectrum, we observe a colorful, glowing effect. Emission of this form is termed fluorescence. This process is practically instantaneous so the fluorescence is observed as soon as the exciting source is present, and it disappears as soon as the exciting source is removed.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Evidence, models, and explanation
Content Standards: Grades 5–8
Content Standard B: Physical Science, properties and changes of properties in matter, transfer of energy
Content Standard F: Science in Personal and Social Perspectives; personal health
Content Standards: Grades 9–12
Content Standard B: Physical Science, structure and properties of matter, interactions of energy and matter
Content Standard F: Science in Personal and Social Perspectives; personal and community health

Answers to Worksheet Questions

1. Describe what happened in this demonstration.

   A small amount of Glowing Germ lotion had been placed on the doorknob, which we all touched. When the lights were turned off and the black light turned on, not only did our hands glow, but everything all of us touched glowed too. The glowing lotion was basically all over the room.

2. What does this teach you about hygiene and safety in the lab?

   Hygiene and safety, such as wearing gloves or washing your hands, are very important in the lab. The Glowing Germ lotion showed how quickly and easily a substance spreads if just a small amount of it touches your hand.

3. Fluorescence, the process by which the lotion glowed, only occurs in the presence of an exciting source, and if that source is removed, the fluorescence will cease. What was the exciting source in this demonstration?

   The exciting source in this demonstration was the ultraviolet light.

Acknowledgment

Special thanks to Rhonda Reist of Olathe North High School in Olathe, KS, for providing us with the idea and the instructions for this activity.

Materials for *Glowing Germ* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP9080	Glowing Germ Demonstration Kit
AP9030	Ultraviolet light source, 18"

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.

Name: _____

Glowing Germ Demonstration Worksheet

Discussion Questions

1. Describe what happened in this demonstration.

2. What does this teach you about hygiene in the lab?

3. Fluorescence, the process by which the lotion glowed, only occurs in the presence of an exciting source, and if that source is removed, the fluorescence will cease. What was the exciting source in this demonstration?