

Bay Area Scientists in Schools Presentation Plan

Lesson Name Things that Glow

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Grade Level 3

Standards Connection(s) (1) sun → source of energy → light; (2) atoms/elements; (3) combining substances to create new substances

Abstract: During our visit, we will introduce students to the concept of light as a type of energy, and how the study of light is related to many aspects of the world around them. We begin our discussion using the sun as the main example of an energy/light source, move on to a more detailed account of the way light travels and interacts with matter, and conclude by showing various ways light can be created and used to identify different substances. Demonstrations include use of a prism to split white light into its colorful components, burning several common substances in a flame to show the distinct colored emission of different elements, and distribution of “glow bracelets” which glow strongly in various colors as a result of a chemical reaction (the students may keep these bracelets as a souvenir!).

Vocabulary/Definitions:

- emit
- absorb
- color
- atom
- element
- molecule

Materials: We will bring with us glow sticks, flame test accessories (compounds, butane torch, etc.), prism, diffraction grating glasses, photos of rainbows, pickle and electrodes (for conclusion of flame test demo), worksheet for the students to record their observations of the flame test

Students should have ready pencils to record observations for the flame test.

Classroom Set-up: Table in front; electrical power; ability to make room as dark as possible; 5-10 min set-up time, 10 min clean-up time

Classroom Visit

1. Personal Introduction: _____ **10** _____ Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests?

Introductions: who we are, where we're from; We want to share with students that light as a form of energy is all around them and interacts with matter in some interesting ways.

Topic Introduction: _____ **15** _____ Minutes

- (1) Sun as ultimate source of energy → light → splitting into separate colors by prism
- (2) Atoms and elements make up all matter, and different elements can emit different colored light
- (3) Atoms and elements combine to make new molecules, a process which can produce light

2. Learning Experience(s): _____ **25** _____ Minutes

Demonstrations, hands-on activities, images, games, discussion, writing, measuring... What will you do, what will kids do? Describe in order, including instructions to kids.

- (1) Show pictures of sun, rainbow; diffraction grating glasses
- (2) Prism to separate light into different colors
- (3) Flame tests with several compounds to show different elements emitting different colored light
- (4) Glow bracelets to demonstrate chemiluminescence: atoms/molecules combining to form new molecules and giving off light in the process
- (5) Glowing pickle: electrodes attached to pickle, current applied and pickle glows bright yellow due to sodium; students should recognize this from earlier flame test demo and be able to use the data they recorded to guess this "unknown" element due to the yellow color

3. Wrap-up: Sharing Experiences and Building Connections _____ **10** _____ Minutes

Putting the pieces together – how will students share learning, interpret experience, build vocabulary?

The pickle demo will help to connect back with the concept of light being used as a means of identifying different elements as demonstrated earlier in the individual flame tests. A short review of keywords and concepts will also serve to wrap-up and test for understanding.

4. Close: _____ **5** _____ Minutes

How can kids learn more? Thanks and good-bye! Clean-up.

TOTAL _____ **50 – 60** _____ Minutes



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Follow-up – After Presentation

Suggest students write a letter explaining “How we learned about _____?”

List or attach examples of activities, websites, connections for additional learning.

Attach worksheets, hand-outs, visuals used in classroom presentation.

Thar She Glows from Oregon Museum of Science and Industry (OMSI) - Learners observe glow-in-the-dark objects in a homemade light-proof box. Objects can include glow sticks, glow-in-the-dark toys, and toys with fluorescent paint. The box is built with a black light installed, which can be controlled with a switch outside the box. Background information is provided about the difference between fluorescence (glows only when light is shined on it) and phosphorescence (continues to glow after light is removed), and an electron-level explanation is also provided.
<http://www.omsi.edu/sites/all/FTP/files/chemistry/U6LightAndDark.pdf>

Luminescence from Mount Holyoke College Passport to Chemistry Adventure Program - In this two-part activity about luminescence, learners explore the chemistry that happens inside glow sticks and other light producing reactions. First, learners build a ground state model and a excited state model of light. Then, learners use glow sticks to perform chemical reactions to make light (chemiluminescence) and test how well the reactions work at different temperatures. These activities are part of the "Passport to Chemistry Adventure" kit but the kit is not necessary to have in order to facilitate the activities.
https://www.mtholyoke.edu/courses/magomez/ChemistryPassport/List_of_3-6_Kits_files/LuminescenceKit.pdf