

CIC Lesson Plan

Lesson Name Things That Glow: From Fireflies to Quantum Dots

Developed by Bryce Sadtler

For Grade 3

Related CA Science Standards and Vocabulary

Specific standards and new vocabulary related to lesson

CA Science Standard(s): Energy can be stored and used in many forms. Light is one form of energy, which can be produced from the conversion of other forms of energy such as heat and chemical energy. Light can interact with matter in a variety of ways

Vocabulary/Definitions:

absorb: to take in

emit: to give off

quantum dots: tiny particles which both absorb and emit light

chemiluminescence: light produced by a chemical reaction

Introduce and Engage

Making personal connections, engaging curiosity, building connections to kids' experiences

Personal Introduction: *What do you do for work, hobbies, play? Why are you interested in this topic?*

I am a graduate student working towards a PhD in physical chemistry at UC Berkeley. My research involves the study of tiny particles, known as quantum dots, and the way they interact with light. This work is very exciting to me because of its futuristic applications in computer technology.

Building Connections to Kids' Experiences: *Can you think of an experience most kids would have related to your topic? Is there something to show that will grab their attention? Or can you pose a mystery with a question about something they see everyday?*

We will begin with a question and answer session about what is light and where it comes from. After talking about common sources of light, such as the sun, I will tell the kids about unusual objects, which give off light like fireflies and quantum dots. The emphasis will be that light is a form of energy and is produced from other forms of energy.

Learning Experiences

Any combination of demonstrations, hands-on activities, and pictures that helps kids explore new ideas.

Describe specific experiences in the order you plan, including instructions you need to give students. What kids will see, do, hear, touch, taste or make.

Two demonstrations will be performed showing involving materials that glow

- 1) Quantum dots are tiny particles, dissolved in a liquid, which can absorb light from an ultraviolet lamp. The particles can then emit colored light of their own. Different sized particles emit different colors of light.
- 2) Chemicals can be mixed together to create a chemical reaction. In some cases the reaction can emit light, which is known as chemiluminescence. Two such reactions, which emit blue and gold light, will be displayed.



Sharing Experiences & Building Ideas

What kids will share about experiences and how to help them interpret experiences to build ideas and vocabulary.

To become more familiar with the way scientists observe and characterize a material, the children will be given several common objects (eg a mirror, black cloth, a glow ball). They will then fill in an observation checklist noting whether the object absorbs, reflects, or emits light.

Follow-On Activities

Ideas for follow-on activities, your favorite kid books, things to notice

I would be delighted if the students wrote letters to me telling me what they learned or asking any questions they may have.

Materials and Preparation in Classroom

required materials and classroom set-up for complete lesson.

Volunteer Brings: For the demonstrations I will be bringing an ultraviolet lamp, solutions of quantum dots, and the chemicals and glassware needed for the chemiluminescent reactions.

For the activity, I will bring several household items (eg a flashlight, black cloth, etc) to study the interaction of light and matter.

Classroom Needs: electrical outlet

Set-Up Requirements: Need to be able to make the room relatively dark

