

Starlight Lab

Summary

Students will analyze light given off by glowing elements using a spectroscope. They will relate the spectrum given off by a stationary source to one that is "red-shifted".

Main Core Tie

Science - Earth Science

[Standard 1 Objective 1](#)

Time Frame

1 class periods of 70 minutes each

Group Size

Pairs

Materials

salts or vapor tubes of several elements Sodium, Potassium, Lithium Strontium, hydrogen, helium, argon, mercury etc.

- [student sheet 1](#)

(attached) OR

- [student sheet 2](#)

(attached)

(NOTE: Two slightly different sheets are available, choose the one that best suits your needs), diffraction grating slides (easier to use for students)

spectroscope (a very fun form of spectroscope can be ordered from: EKOS USA, INC, 2132 Adam Ave, San Leandro CA 994577, they are listed as: SPXM and are \$2.00 a pair.) These are a wraparound pair of glasses with diffraction gratings built in. They show a nice spectrum.

colored pencils or crayons

Background for Teachers

There are several ways to generate light for this experiment. The most difficult for the students is to burn small amounts of the various metal salts in a flame on a wire loop. The best way for students to see spectra is to buy the vapor tubes of each element or mixture of elements and the power source (a Tesla coil also works) that runs electricity through them. This is more expensive but they last a long time. You can also find commercially made light bulbs with mercury vapor, argon, and neon in them. If you have tubes with "air" in them, students could figure out what gases are in air. You would also need tubes of nitrogen, oxygen and carbon dioxide for them to look at.

Student Prior Knowledge

Students should know that elements are pure substances with distinct properties. One of the properties is the banding pattern seen through a spectroscope when the substance is burned or heated. The radiation is given off in various wavelengths which can be viewed with a spectroscope or diffraction grating. If the object giving off the radiation was moving away from the viewer the lines will shift toward the red end of the spectrum.

Instructional Procedures

Hand out student sheet and go over purpose and procedures with students.
Make sure students can see the spectrum on room lights.
Turn out the lights and use the light source you have chosen to create light spectra.
Have students color the spectra on their paper as they see it.
Students finish with analysis and conclusions.

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

Authors

[Utah LessonPlans](#)