

Cereal Box Spectroscope

Summary

Students will create their own spectroscopes, take measurements and calculate wavelengths, frequencies and energies of different colors of visible light.

Time Frame

1 class periods of 90 minutes each

Group Size

Small Groups

Materials

- [student sheet](#)
(attached)
- 1 cereal box per 3 students
- black construction paper
- 1-600 lines/mm diffraction grating for each group (about 11)
- tape
- classroom set of rulers
- classroom set of scissors
- atomic gas spectrum tubes
- power supply

Background for Teachers

Time Needed:

1- 85 min class period. Students will need about 25 min to construct their spectroscopes, 25 min to take their data, and 35 min to do their data analysis.

Student Prior Knowledge

Orbitals, electromagnetic spectrum, light waves and photons

Instructional Procedures

Review the concepts of electrons releasing energy in the form of light and the electromagnetic spectrum.

Explain how a prism separates light into its components. Also, explain how a diffraction grating separates light into its components. Tell students we will be constructing our own spectroscopes using diffraction gratings.

Organize students into groups of 3 or 4 and begin writing their lab reports (title, hypothesis, materials, procedure). They should work on this while going over instructions as a class.

Show students an example of a cereal box spectroscope. Then have them read aloud the instructions on the student sheet on how to construct the cereal box spectroscope.

Give the students time to construct their spectroscopes. Once they have them constructed, they should pass them off with the teacher to receive their diffraction grating and begin working.

Students will then record the spectra of fluorescent light (classroom lights), and 2 atomic spectra using the atomic gas tubes.

Once students have their data, they must calculate the wavelength, frequency and energy of each of the lines in their 3 spectra. They should see that the some of the lines have the same

wavelengths because they are the same type of light.

Have students write a conclusion to their lab and clean up their materials. They can take their spectrometers home. You may consider having one class construct the spectrometers and then just use them again and again for each class.

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

Authors

[Utah LessonPlans](#)