

Activity 5 Overview

This activity shows the students that a gas will give off a visible color when the gas discharge tube is excited. However, when the students examine this light with a spectroscope they find that it gives a certain colored line spectrum. This is a fingerprint of an element and each element has its own characteristic line spectrum. This activity will also allow students to expand on the observations to the point that they calculate the amount of energy being emitted at each wavelength.

Safety Requirements

In the margins of the student pages you will find safety warnings that should be rigorously followed.

- Security of the high-voltage supply and hydrogen-gas discharge tube.
- Some x-rays may be emitted while using the hydrogen-gas discharge tube. Minimize operation time.

Preparation and Materials Needed

Preparation

Make certain that the high-voltage power supply and hydrogen-gas tube are secure and that no one can receive an electrical shock. The room must be able to be darkened so that the students can see the line spectrum produced by the hydrogen gas. If a spectroscope is available, the student will need some light to be able to read the scale.

Time Requirement

You should plan on two laboratory periods to complete. The first period will be a demonstration using the hydrogen-gas tube. If you have a spectroscope with a scale you could talk about the line color and how it relates to the wavelengths. The second laboratory period will require ample time to build the energy spectrum.

Materials/Chemicals needed

- Hydrogen-gas discharge tube
- High-voltage power supply to power hydrogen-gas tube (Suggest that you use a commercial spectrum tube power supply. (Flinn AP 1327)
- Spectroscopes (one per student) or diffraction grating lens
- Scissors