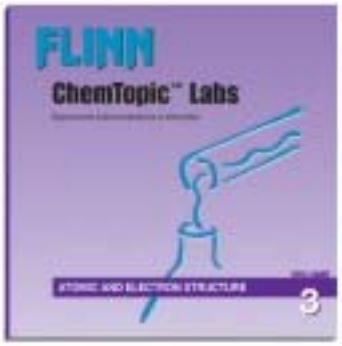
Atomic and Electron Structure—Demonstration Summaries and Concepts



The Think Tube—A Black-Box Demonstration

What was it like to imagine the structure of the atom? Students will appreciate the challenges associated with understanding things they cannot see, such as atoms, as they try to solve the structure of the "Think Tube" apparatus.

Energy in Photons—Light Energy Demonstration

What is the difference between the intensity of light and its energy? When white light is shined through different color filters onto a "glow-in-the-dark" phosphorescent strip, only certain spots will glow. What color light will have enough energy to excite the phosphorescent strip? Find out with this simple but very effective demonstration!

The Photoelectric Effect—Light Energy Demonstration

When light is shined on a metal surface, the metal may lose electrons. This phenomenon, called the photoelectric effect, was the classical paradox that led to the development of the quantum theory of matter. Now students can test this paradox themselves using an electroscope and different types of light sources.

Measuring the Size of a Molecule

The size of a molecule—surely we cannot measure that directly! When a drop of an "oily" molecule such as oleic acid is added to a pan of water, it disperses to form a very thin film that has a depth of only one molecule. By measuring the diameter of the film and making a few assumptions, we can estimate the length of the oleic acid molecule.

Mapping Atomic Structure—Building a Scale Model

Most of the size of an atom is apparently empty space. Just how big is an atom compared to the small dense nucleus at its core? In this activity, students use a basketball and a map of their city to draw a scale model of their city "atom" that has a basketball "nucleus."

Excited States—A Musical Demonstration

Telling students that electrons lose energy in the form of light in the transition from a higher energy excited state to a lower energy ground state sounds pretty boring. Things get a little more exciting with this musical demonstration set to the tune of "I'm So Excited" by the Pointer Sisters!

Oooh! Aaah! Flame Tests—Chemical Demonstration

Demonstrate the characteristic emission colors of metal ions with a flame test that is easy to set up and large enough for the entire class to observe. Place a small scoop of a different metal salt into each of five Pyrex® Petri dishes, add a few milliliters of alcohol, then light each solution and listen for the ooohs and aaahs as a rainbow of colors emerges. Look for the comprehensive safety instructions included with this demonstration.

Concepts

- Scientific method
- Observation
- Hypothesis
- Phosphorescence
- Absorbance vs. transmittance
- Energy and wavelength of light
- Photoelectric effect
- Energy and wavelength of light
- Quantization of energy
- Atomic structure
- Chemical bonding
- Atomic nucleus
- Atomic radius
- Photon emission
- Excited states
- Ground state
- Flame test
- Atomic emission
- Quantization of energy

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