Red-Green Light Spectrometer Teaching Aid



Overview

Make your own Spectrometer Learn how to make your own homemade spectrometer using simple materials. Use light to analyse substances! Part of >150 free scie.

Key Takeaways

A Red-Green Light Spectrometer Teaching Aid is a low-cost, educational device that uses red and green LEDs to demonstrate light absorption and basic spectrometry concepts in classrooms.

Overview

A Red-

Green Light Spectrometer is designed for hands-on learning, allowing students to explore how light interacts with materials. It typically consists of tri-color LEDs (red, green, and sometimes blue) and a light sensor.

The LE

Ds emit light of specific wavelengths, which passes through a sample solution or material. The sensor measures the intensity of transmitted light, showing how much light is absorbed by the sample. This setup provides a simplified version of a full spectrometer, making it ideal for educational purposes.

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How It Works

Light Source: Red and green LEDs emit light at specific wavelengths corresponding to their colors. Sample Interaction: The light passes through a solution or colored material. Substances absorb certain wavelengths depending on their chemical composition.

Detection: A light sensor measures the transmitted light intensity. The difference between emitted and detected light indicates the absorbance, which correlates with the concentration or color intensity of the sample. Visualization: Students can observe changes in light intensity or color, helping them understand concepts like absorption spectra, Beer's Law, and color mixing.

Educational Applications

Demonstrating Absorption: Students can measure how red or green light is absorbed differently by colored solutions, such as food dyes or plant extracts. Color Analysis: By comparing transmitted light, students learn how different substances selectively absorb certain wavelengths.

Hands-

On Experiments: The device can be used in experiments to explore concentration effects, solution color intensity, and basic quantitative analysis.

Safe and Low-

Cost: Unlike full laboratory spectrometers, this teaching aid is portable, robust, and uses minimal reagents, making it suitable for classroom use.

Construction and Variations

Some educational spectrometers can be homemade using simple materials, such as a CD as a diffraction grating, a slit for light entry, and LEDs as light sources. More advanced versions, like the Spektra™ spectrometer, are commercially available and designed specifically for schools, offering intuitive operation and low reagent consumption. These devices can also be upgraded to perform additional experiments, such as semi-quantitative measurements or chromatography demonstrations.

Summary

A Red-

Green Light Spectrometer Teaching Aid provides a practical, visual, and interactive way to teach students about light absorption, color, and basic spectrometry. It bridges the gap between theoretical concepts and real-world observation, making it an effective tool for chemistry and physics education.

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Article Content

Make your own Spectrometer

Learn how to make your own homemade spectrometer using simple materials. Use light to analyse substances! Part of >150 free science expeirments.

Experiment1-Spec

Using a white light source and a monochromator (a prism), the spectrometer of the instrument is designed to provide discrete wavelengths of light at a known intensity.

2.1.5: Spectrophotometry

Spectrophotometry is a method to measure how much a chemical substance absorbs light by measuring the intensity of light as a beam of light passes

Build your own spectrophotometer | Feature | RSC Education

By designing and building their own visible-light spectrophotometers, students get to grips with the underlying principles of this widely used analytical tool.

Ultraviolet–visible (UV-vis) spectroscopy

Learn how UV-visible radiation can be used to shed light on chemical identification and how our senses percept colour. From the theory behind molecular orbitals and electronic transitions to the application

Homemade Spectrometer

In this chapter I will show you how to assemble a filter spectrometer, as well as the first tests with the six colors that the AS7262 sensor detects.

How To Measure Colors Properly

The most common day-to-day “spectrometer” we use, without even knowing it is one, is a color camera which is in its essence a filter spectrometer.

Introduction to Spectrophotometry

Procedures for planning and working through a series of related experiments. Note: Remember to put all of your data, answers to questions and problems, and notes on the blank pages of this lab manual.

Spectrophotometer

In this model we describe how to build and test a spectrophotometer for just over $10 (one that works as well or better than options costing orders of magnitude more). IMPORTANT!!! Under no

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PROCEEDINGS OF SPIE

This spectral analysis is therefore useful in schools, among other topics, to enable the recognition of chemical elements through spectroscopy, and to alert students to the different spectra of illuminating

7.3: Atomic Spectroscopy and The Bohr Model

(a) A sample of excited hydrogen atoms emits a characteristic red light. (CC BY-SA 3.0 Unported; Science Made Alive via Wikipedia) (b) When the light emitted by a

Interferometry

Interferometry makes use of the principle of superposition to combine waves in a way that will cause the result of their combination to have some meaningful property that is diagnostic of the original state of

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How to Build Spectrometer

Materials A small white LED light bulb. Suggested: a Ultra-White LED 5mm A power source for the light bulb. Suggested: a 3-V coin battery A small visible-light grating. Suggested: A 500 line/mm linear

Experiment 10 Dye Concentration Using a UV-Vis Spectrophotometer

In this experiment, you will determine the concentration of Allura Red Dye (FD&C Red No. 40) in a drink. By mixing a series of known concentration solutions of the dye and measuring absorbance ultraviolet

Measuring and teaching light spectrum using Tracker as a spectrometer

However spectrometers are usually expensive. In this work we show how to build a low-cost spectrometer with a reasonable measuring accuracy, using affordable components (commercial

How to build a low cost spectrometer with Tracker for teaching light ...

How to build a low cost spectrometer with Tracker for teaching light spectra This content has been downloaded from IOPscience. Please scroll down to see the full text.

A Homemade Cost Effective Raman Spectrometer with High

The characteristics of a low cost, easy to construct, homemade Raman spectrometer are described and its performance presented and discussed. The light sensor of the spectrometer is a consumer grade

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