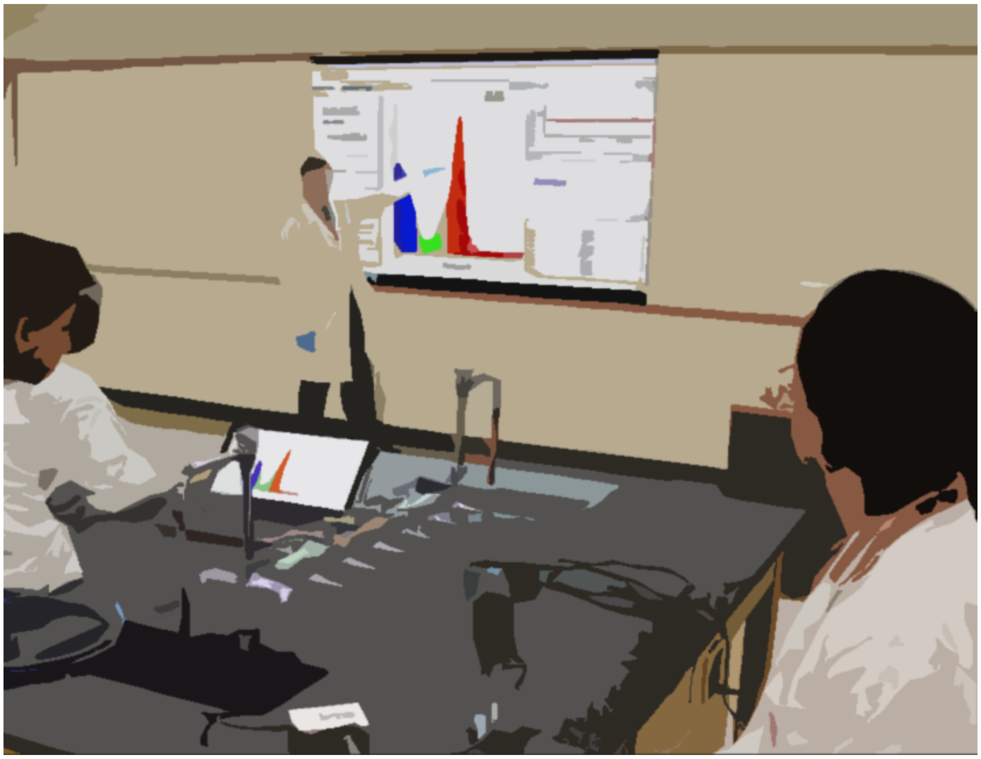

SpectroKit
(Educational)

Simple Spectroscopy for all grades

UV-VIS-NIR

Creative & Innovative

Up to 50 Educational Experiments

TEKSAN EDUCATIONAL SPECTROKIT

School grade Spectroscopy

Teksan Co. offers a complete Kit of spectroscopy and accessories for schools and teaching labs, including the basic spectroscopy kit with all the tools necessary to demonstrate principles of spectroscopy through absorbance, transmission, fluorescence, emission and colorimetry measurements. Peruse this catalog for kit components, measurement tips and applicable fields.

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Educational SpectroKit

Spectrophotometric Characterization of Spice Extracts

Spices have a long and rich history around the world. In some senses (pun intended), the cuisine of a particular region identifies itself with specific local spices. For centuries, spices have been used to modify the flavor of prepared foods, help preserve foods and act as herbal remedies for a wide variety of real and imagined ills.

Along with the important role of contributing to the flavors of foods, spices are also employed to modify the color of foods. Turmeric adds a strong yellow tinge to curries while saffron offers a softer yellow to paellas. Paprika contributes a deep, vibrant red to chicken paprikash as well as presenting a vivid, flavorful spice garnish to simple cottage cheese.

By Teksan SpectroKit experiments, you will use isopropanol, also known as rubbing alcohol, to prepare extracts of a selection of spices. You will then use an Teksan Emerald spectrometer and light source to measure the visible light absorbance spectra of several known spice extracts. Once you have built your “database” of known spice spectra, you'll measure the absorbance spectra of an unknown spice sample and compare it with spectral database to determine the identity of the unknown spice.

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Radiometric Characterization of LEDs

LEDs are used for all sorts of applications from lighting to horticulture. By using LEDs to provide greenhouse lighting, farmers and growers have the power to control crop illumination to impact growth characteristics and yield. Horticulturists are interested in the effects of light on the growth of their crops, with much analysis of how the intensity of blue and red light affects both the growth rate and blossoming of various floral crops. Until now farmers and horticulturists were limited in their options to control and measure the illumination of their crops. But recently the horticultural industry has been experimenting with the addition of red, blue and white LEDs to existing illumination systems. The idea is to better tune the spectral content to match the needs of the crops. Continuously monitoring the LED emission spectrum with a miniature spectrometer enables growth patterns to be correlated with the illumination spectra.

Thanks to the evolution of small, handheld spectrometers, LED based applications are more easily managed than with previous instruments. Indeed, spectrometers can be deployed to measure LED emission wavelengths as well as brightness and power output. To appreciate why miniature spectrometers are viable tools for LED measurement, it helps to understand the typical performance parameters being measured.

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Fluorescence of an Unknown Fluorophore

Fluorescent tags have become a powerful tool in research and diagnostics, capable of revealing cellular mechanics in real time, identifying abnormal cells, and sounding the alarm on the presence of pathogens. Still, they are only as powerful as the system used for detection, a key part of which is intelligent selection of excitation wavelength(s). Many fluorescence experiments are performed with a commercial fluorophore like TRITC, Fura-2, or one of the many variants of green fluorescent protein (GFP), in which case determining the best excitation wavelength (or band of wavelengths) is simply a matter of looking up the excitation spectrum. Occasionally, however, it may be necessary to determine the best excitation wavelength or band for an unknown fluorophore through experiment.

There are several approaches that can be taken when choosing an excitation light source for a fluorophore. If using an LED, it is best to choose one with a center wavelength close to the peak excitation spectrum wavelength. If using a laser, the excitation intensity will be so much higher that it is possible to even use a wavelength on the tail of the excitation curve. If using a broadband light source for excitation, it can be filtered using a single bandpass filter, taking care to ensure that the excitation light minimizes overlap with the emission spectrum.

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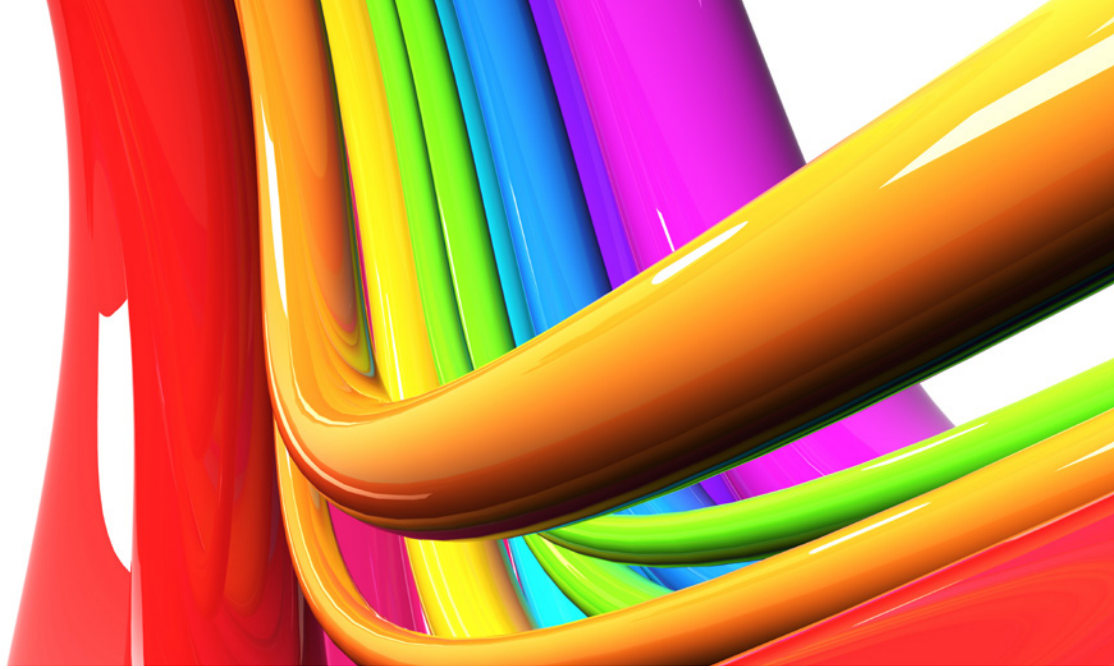

Educational SpectroKit

Determining Color Difference

Color matching and color consistency have become important quality control parameters in many markets. In the textile industry, a continuous swath of fabric moving through production equipment may be tested for variability, or different batches may be compared for consistency. In food quality control, the desired product color is carefully tuned to consumers' tastes, and the product must look the same despite being produced at different factories. In commercial lighting, bulb-to-bulb consistency to within the limits of human detection is extremely important. This is particularly true for banks of white light or colored LEDs, or any type of lighting array.

Measuring color is challenging, as the way our eyes detect color is not directly related to easily measured parameters such as light intensity. Color is dependent on the sample, on the illuminant and on subjective human perception. Spectral sensing, however, makes color measurement quantifiable, repeatable and consistent. Measuring the amount of light across the entire visible wavelength range brings real advantages when compared to traditional colorimetry due to the higher resolution and wider bandwidth of the measurement.

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