APPLICATION NOTE:
UV/VIS ABSORBANCE CHEMISTRY

Techniques

- UV/VIS Absorbance

Keywords

- UV/VIS Absorbance
- Analytical Chemistry
- Colloids & Nanoparticles
- Reaction Monitoring

Abstract

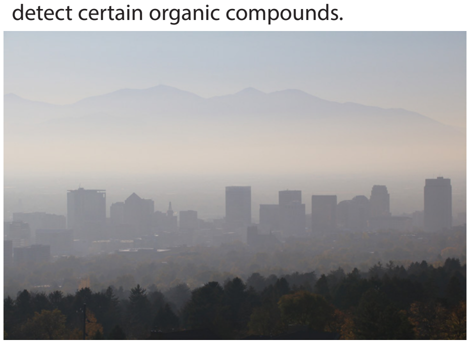
Chemistry, as a science that is so universally applicable, has fields of study that are all over the map. These disparate studies in chemistry mean that researchers and chemists could be working in industries just as varied. But there are some shared techniques and technologies used by researchers and industrialists that span the chemistry gamut.

UV/VIS Spectroscopy is one of the common tools in many chemist's tool box. This versatile measurement technique has a secure place in the chemistry lab.

UV/VIS in the Spot Light

UV/VIS spectroscopy refers to absorption/ reflection measurements performed in the ultraviolet and visible light spectrum.

The Beer-Lambert law, which relates the attenuation of light to properties of the material the light is passing through, states that the absorbance of a sample is directly proportional to the concentration of the absorbing analyte. You can frequently see this axiom at work in analytical chemistry to quantify analytes, monitor processes and reactions, and detect certain organic compounds.



Air Pollution hangs over Salt Lake City, November 2016

Atmospheric Chemistry

512px Salt Lake City smog haze skyline 01Atmospheric chemistry plays a central role in our understanding of the mechanisms of local climate conditions and factors into global radiative balance as well. Researchers study a class of compounds called Secondary Organic Aerosols (SOAs) which are the reactive products of gas-phase photooxidation of both naturally-occurring and man-made volatile organic compounds (VOCs). There have been many studies on the reaction mechanisms in the propagation of SOAs, Dr. Kun Li and a team of fellow researchers from the Institute of Chemistry at the Chinese Academy of Sciences and the Beijing National Laboratory for Molecular Sciences looked more closely at the optical properties of these aerosols under varying reactive conditions [1].

The scattering and absorptive properties, the direct components of the refractive index are more dependent on the composition of the aerosols than of the concentration or particle size. Understanding the link between the chemical composition of aerosol pollutants and their optical properties allows for a much more accurate estimate of the global radiative effects of localized reactive conditions.

Dr. Li's team's work tested the optical properties of SOA particles generated in a Teflon smog chamber in the lab from several different precursor compounds and under varying NOx levels. Using the AvaSpec-2048L spectrometer, the particles were shown to be non-absorbent at wavelength 532 nm. Retrieving Refractive Indices (RI) for each sample at that wavelength yielded values ranging from 1.38-1.59 depending on which precursor compound generated the SOA and under what concentration of NOx, but independent of the concentration of SOA or of particle size. Ultimately their work suggests that many environmental models may overestimate the Refractive Index, and in turn the global radiative effects.

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