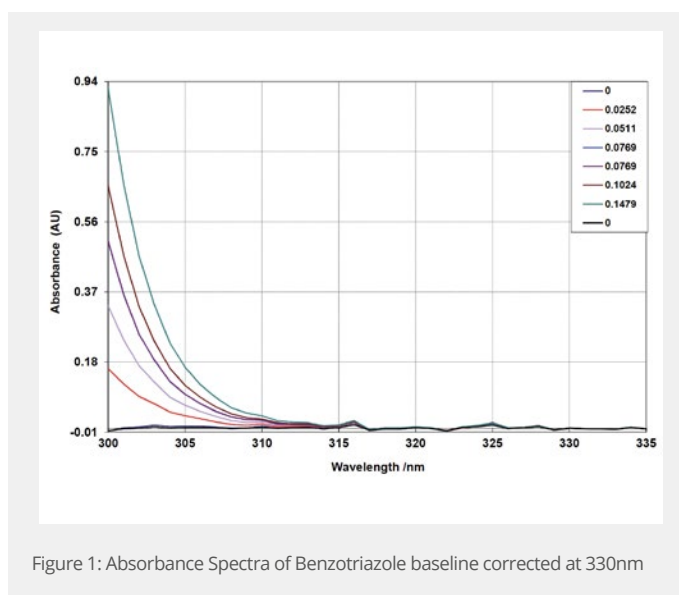


APPLICATION NOTE

Benzotriazole Using Fiber Optic-based, UV-VIS Spectroscopy

Our product line includes a 508 UV-VIS™ spectrometer. This application note discusses the use of our hardware and software tools for the measurement of benzotriazole using fiber optic-based, UV-VIS spectroscopy. UV-VIS spectroscopy can be applied in real time directly in process monitoring or as a laboratory procedure. In either case UV-VIS spectroscopy is a time and money saving alternative to traditional laboratory methods.



Background

Benzotriazoles have many uses. They can be used in the semiconductor industry in wafer cleaning, an anti-freeze ingredient for de-icing airplanes, in photographic developing baths, as a corrosion inhibitor for copper and bronze, a UV stabilizer in some plastics, and as a precursor for many pharmaceutical compounds. Though benzotriazoles are readily water soluble they are not significantly biodegradable or readily removed by common water treatment methods. Benzotriazoles are toxic to some aquatic species and plants. Therefore, it is easy to find reasons for monitoring benzotriazoles.

The UV-VIS region of the electromagnetic spectrum displays electronic transitions and is particularly useful for identifying conjugated and aromatic molecules. By measuring the UV spectra of a series of samples of known benzotriazole concentration, a quantitative model can be developed which will allow the measurement of future samples based only on their UV spectrum. Our analyzer systems use fiber optics to allow the sample probe to be located in remote locations away from the spectrometer, greatly reducing the level of operator contact with the process stream while providing a real time assessment of stream composition.

Experimental

The UV spectra of a group of aqueous benzotriazole samples of up to 0.15% w/w were measured using a 508 UV-VIS process spectrometer. The unit was zeroed using water, allowing the spectral features attributed to benzotriazole to be more easily seen. Figure 1 shows the absorbance spectra collected using a 2 mm pathlength cuvette cell from 300-335nm after baseline correction at 330nm.

Analysis

The absorbance at 305nm is plotted vs concentration in Figure 2.

The fit shows excellent linearity with a correlation of .999. The standard error of calibration was found to be 0.002%w/w.

Discussion

The measurement of benzotriazole concentration in water using UV spectroscopy is both fast and reliable utilizing the 508 UV-VIS analyzer as described here. This method minimizes the need for laboratory sample collection. Results are available in real-time (seconds) for benzotriazole concentration in aqueous streams. For more detailed information regarding system specifications please contact Process Insights technical sales specialist.

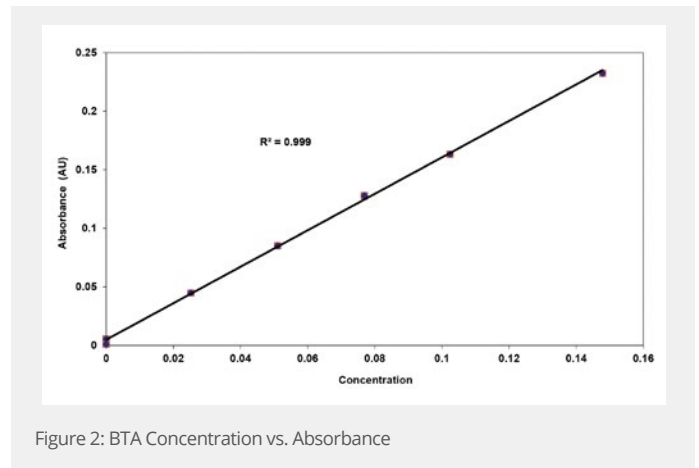


Figure 2: BTA Concentration vs. Absorbance



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