Chemistry researchers receive patent for new scientific measurement instrument

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Two Baylor University chemistry professors have invented a new polarimeter, a basic scientific instrument used to measure and interpret the polarization of transverse waves, such as light waves, that could prove useful in determining the purity of pharmaceuticals. Baylor has now patented the device.

Certain compounds differ only in the way that they interact with polarized light. Plane polarized light is light whose electric vector moves back and forth in a plane. When plane polarized light passes through an optically active medium, the plane of polarization is rotated. The device that measures this rotation is called a polarimeter. To measure the rotation with a conventional polarimeter, a polarizing prism must be rotated and this requires some mechanical parts. Dr. Kenneth Busch, emeritus professor of chemistry at Baylor, and Dr. Dennis Rabbe, chemistry laboratory coordinator at Baylor, have developed a polarimeter that differs from others in that it has no moving parts, which eliminates problems associated with wear and tear and possible inaccurate readings.

"Our device uses two prisms whose planes of polarization are fixed at a certain angle with respect to one another," Busch said. "When these prisms are placed in the beam of a solid-state array detector spectrometer, any rotation caused by an optically active compound rotates the plane of polarization. This rotation reduces the amount of light that reaches the detector of the spectrometer. Because we are using a spectrometer, the device monitors the rotation over a range of different

wavelengths."

Busch said that by having a range of wavelengths with different rotations, researchers can use multivariate statistics to correlate the spectrometer signal with the optical activity of the sample.

Busch said one application that Baylor's polarimeter could prove useful is in pharmaceuticals. Most pharmaceuticals are optically active compounds composed of enantiomeric pairs. In some cases, one member of an enantiomeric pair is the active ingredient of the drug, while the other may be either inactive or toxic, which makes enantiomeric purity an important factor with drug formulations. Polarimeters are used to determine enantiomeric purity.

Provided by Baylor University