

Teaching Raman Spectroscopy in Both the Undergraduate Classroom and the Laboratory with a Portable Raman Instrument

Eva n D. Hudspeth, Danielle Cleveland, Kathleen L. Batchler[†],
Phuong A. Nguyen, Tracey L. Feaser, Lauren E. Quattrochi,
Jesse Morenz, Shrimati A. Balram, and Robert G. Michel
Department of Chemistry, University of Connecticut, Storrs,
Connecticut, USA

Jack X. Zhou and Daniel Lombardi
B&W Tek, Inc., Newark, Delaware, USA

Abstract: We have evaluated a small portable Raman instrument on loan from B&W Tek, Inc., and have determined that it can successfully be used in the classroom both as a visual aid for teaching the fundamentals of Raman spectroscopy and for a variety of undergraduate experiments as a normal component of an instrumental analysis class. Having portable Raman instrumentation would allow the instructor to demonstrate the principles of Raman spectroscopy, as well as the concepts of calibration curves, blank subtraction, detection limits, and regression analysis. Both qualitative and quantitative types of experiments were done for solid Tylenol tablets, aqueous solutions of isopropyl alcohol, dimethyl sulfoxide, methanol, and ethanol, and gaseous CO₂ and N₂O₄. Additionally, surface-enhanced resonance Raman spectra of Rhodamine 6G were obtained using a chloride ion-activated silver colloid. Spectra from the B&W Tek, Inc., instrument were comparable to literature Raman spectra.

Keywords: Calibration curve, portable Raman instrumentation, qualitative and quantitative analysis, teaching Raman spectroscopy, undergraduate experiments

Received 8 March 2005, Accepted 11 April 2005

[†]Present address: Department of Chemistry and Biochemistry, Providence College, Providence, RI 02918-0001.

Address correspondence to Robert G. Michel, Department of Chemistry, University of Connecticut, 55 North Eagleville Road, Storrs, Connecticut 06269, USA. E-mail: robert.g.michel@uconn.edu