Title: Utility of Surface Enhanced Raman Spectroscopy (SERS) for Elucidation and Simultaneous Determination of Some Penicillins and Penicilloic Acid Using Hydroxylamine Silver Nanoparticles

Authors: Marwa R. EL-Zahry¹,², Ibrahim H. Refaat², Horria A. Mohamed², Erwin Rosenberg¹, Bernhard Lendl¹

Source: Talanta, 144, 710-716 (2015), http://dx.doi.org/10.1016/j.talanta.2015.07.015

Address: ¹Institute of Chemical Technologies and Analytics, Vienna University of Technology, Getreidemarkt 9/151, A-1060 Vienna, Austria, ²Department of Pharmaceutical Analytical Chemistry, Faculty of Pharmacy, Assiut University, 71526 Assiut, Egypt

Elucidation and quantitative determination of some of commonly used penicillins (ampicillin, penicillin G and carbenicillin) in the presence of their main degradation product (penicilloic acid) were developed. Forced acidic and basic degradation processes were applied at different time intervals. The formed degradation products were elucidated and quantified using surface enhanced Raman spectroscopy (SERS). Silver nanoparticles (AgNPs) prepared by reduction of silver nitrate using hydroxylamine-HCl in alkaline medium were used as SERS substrate. The results obtained in SERS were confirmed by the application of LC/MS method. The concentration range was 100-600 ng/ml in case of the studied penicillins and 100-700 ng/ml in case of penicilloic acid. An excellent correlation coefficient was found in case of ampicillin (r = 0.9993) and in the case
of penicilloic acid \( (r = 0.9997) \). Validation procedures were carried out including precision, robustness and accuracy by comparing \( F \)- and \( t \)-values of both the proposed and reported methods.