Accepted Manuscript

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PII: S0003-2670(16)30192-1

DOI: 10.1016/j.aca.2016.02.007

Reference: ACA 234410

To appear in: *Analytica Chimica Acta*

Received Date: 21 December 2015

Revised Date: 29 January 2016

Accepted Date: 1 February 2016

Please cite this article as: S.M. Rosolina, J.Q. Chambers, Z.-L. Xue, Direct analysis of palladium in active pharmaceutical ingredients by anodic stripping voltammetry, *Analytica Chimica Acta* (2016), doi: 10.1016/j.aca.2016.02.007.

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Direct analysis of palladium in active pharmaceutical ingredients by anodic stripping voltammetry

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Abstract

Anodic stripping voltammetry, a classical electroanalytical method has been optimized to analyze trace Pd(II) in active pharmaceutical ingredient matrices. The electroanalytical approach with an unmodified glassy carbon electrode was performed in both aqueous and in 95% DMSO/5% water (95/5 DMSO/ H_2O) solutions, *without* pretreatment such as acid digestion or dry ashing to remove the organics. Limits of detection (LODs) in the presence of caffeine and ketoprofen were determined to be 11 and 9.6 $\mu g\ g^{-1}$, with a relative standard deviation (RSD) of 5.7% and 2.3%, respectively. This method is simple, highly reproducible, sensitive, and robust. The instrumentation has the potential to be portable and the obviation of sample pretreatment makes it an ideal approach for determining lost catalytic metals in pharmaceutical-related industries. Furthermore, the simultaneous detection of Pd(II) with Cd(II) and Pb(II) in the low $\mu g\ L^{-1}$ range indicates that this system is capable of simultaneous multi-analyte analysis in a variety of matrices.

Keywords: Palladium, active pharmaceutical ingredients, anodic stripping voltammetry, unmodified glassy carbon electrode

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