ULTRA-TRACE DETERMINATION OF RHODIUM IN CAR EXHAUST SAMPLES USING UV PHOTOLYTIC DIGESTION AND DIFFERENTIAL PULSE VOLTAMMETRY

Islam Hassan[1,2,3], Rasa Pauliukaitė[2], Gerd-Uwe Flechsig[3]

[1]Vilnius University, Faculty of Chemistry and Geosciences, Institute of Chemistry, Vilnius, Lithuania.
[2]Centre for Physical Sciences and Technology (FTMC),Department of Nanoengineering, Vilnius, Lithuania.
[3]University of Coburg, Faculty of Applied Sciences and Health, Department of Analytical Chemistry, Coburg, Germany
Islam.hassan@chgf.stud.vu.lt

Rhodium released from automotive catalytic converters[1] has become an emerging environmental contaminant, particularly in urban particulate matter and road dust. Due to its ultra-trace concentrations and strong interactions with organic components in environmental matrices, the reliable determination of rhodium remains analytically challenging. Rhodium in environmental samples is often determined by advanced trace metal techniques, such as ICP-MS, which offer high sensitivity but rely on costly instrumentation and extensive sample preparation[2] In this study, an electrochemical approach based on adsorptive stripping voltammetry at a static mercury drop electrode (SMDE) was developed for the determination of rhodium. Particular emphasis was placed on sample pretreatment, as voltammetric measurements are strongly affected by organic interferences and limited electrochemical accessibility of metal species. To address this, ultraviolet photolytic digestion was used as a mild alternative to conventional chemical digestion, enabling effective oxidation of organic matter while minimizing contamination risk[3]. Key electrochemical parameters, including supporting electrolyte composition, solution pH, accumulation potential, and accumulation time, were evaluated. The proposed procedure provides a sensitive and cost-effective alternative electrochemical strategy for monitoring anthropogenic rhodium emissions, contributing to the environmental assessment of traffic-related pollution.

Keywords: Rhodium; Differential pulse voltammetry; Static mercury drop electrode; UV photolytic digestion; Car exhaust

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