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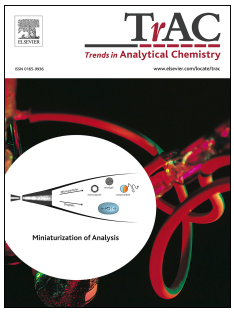

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Recent Developments in the Electrochemical Detection of Explosives: Towards Field-Deployable Devices for Forensic Science

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Abstract

The identification and transportation of trace explosive residues following the detonation of an explosive device or during an explosive related criminal investigation is a crucial yet often time consuming process. The ability to detect explosives at or near an explosion scene therefore offers considerable time advantages in the investigation. For this reason, the development of field-deployable portable analytical instruments is an active area of research. This review explores the potential use of electrochemical sensors for in-situ trace explosives detection. A key focus of this review article is the use of room temperature ionic liquids (RTILs) for the electrochemical detection of explosives. The review compares reaction mechanisms for the electrochemical reduction of TNT in aqueous solutions and in RTILs, before a discussion is made on recent work investigating explosives detection in aqueous, non-aqueous and RTIL-based samples. Finally, commentary is made on the anticipated future direction and challenges of this field.

Keywords

Explosives detection; aqueous solutions; organic solvents; room temperature ionic liquids; electrochemistry; cyclic voltammetry; square wave voltammetry; electrochemical sensors.