

Development of chemiluminescent methods for explosives detection

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Abstract. The present work was finalised to develop chemiluminescent assays more sensitive and easy to use than the analytical methods currently in use to detect traces of TNT (2,4,6-trinitrotoluene), TATP (Triacetone triperoxide) and HMTD (Hexamethylene triperoxide diamine). For TNT detection we developed an indirect competitive ELISA with chemiluminescent end-point (CL-ELISA) and a Lateral Flow ImmunoAssay (LFIA) for on-site analysis, based both on monoclonal antibody commercially available and conjugates specifically synthesized. For the peroxide-based explosives TATP and HMTD we developed an indirect assay which measures, by luminol emission, the H₂O₂ released by these compounds. Both methods showed good sensitivity and reproducibility, with detection limit, LOD, and IC₅₀ values in the ng mL⁻¹ range, CV values lower than 10%. This indirect assay was finally optimized for using in a portable luminometer.

Keywords: explosives, TNT, TATP, HMTD, chemiluminescence, CL-ELISA, LFIA, portable luminometer.