

ON THE EVAPORATION DYNAMICS OF TRINITROTOLUENE MICROPARTICLES ON THE GLASS SURFACE

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The results of measuring the time dependence of the concentration of trinitrotoluene (TNT) vapor over its solid microconcentrations on the glass surface with a low TNT concentration on the surface of 100 ng/cm² are presented. Such microconcentrations of traces are typical for the conditions of anti-terrorist control of objects for the presence of TNT. The measurements were made using a portable multicapillary gas chromatograph (GC) EKHO-V-IDTS (Russia) with TNT vapor concentration. The threshold for determining the concentration of TNT vapor by the EKHO-V-IDTS gas chromatograph corresponds to the modern level and is equal to 10⁻¹⁴ g/cm³. Vapor sampling is performed by a vortex sampling device (VSD), which is used in the anti-terrorist control of objects. It is shown that the initial surface concentration of TNT traces of 100 ng/cm² on the glass surface decreases to 12 ng/cm² in a time of 2.6 h due to evaporation into an open half-space under laboratory conditions. The vapor concentration over the residual TNT concentration of 12 ng/cm² corresponds to the GC sensitivity threshold for TNT vapor concentration equal to 10⁻¹⁴ g/cm³.

KEY WORDS: *solid traces on the surface, evaporation of solid traces, evaporation of trinitrotoluene, evaporation time*

1. INTRODUCTION

At present, the detection of objects containing explosives by analyzing traces of explosive vapor on the surface of objects is widely used in anti-terrorist control (Satro-Paladin, 2019;

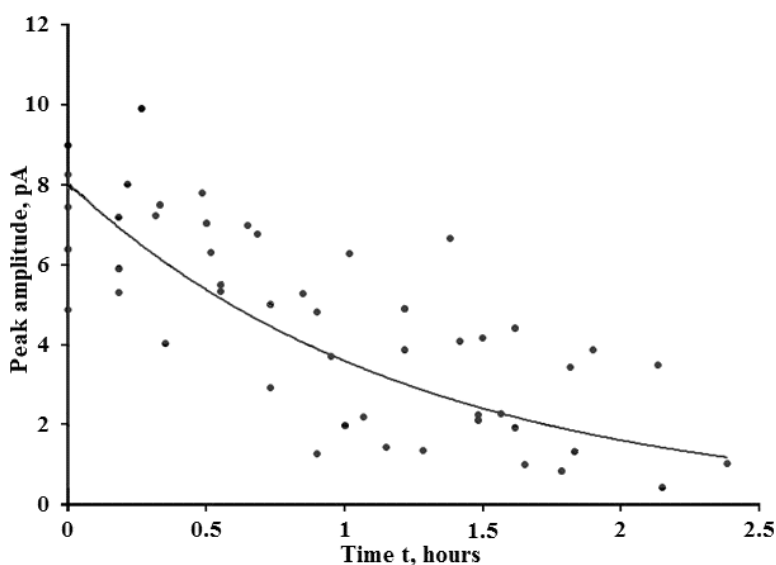


FIG. 7: The resulting dependence of evaporation as measured in five experiments

of 74.5 min in a time of 2.6 h due to TNT evaporation into an open half-space under laboratory climatic conditions. Above the surface TNT concentration of 12 ng/cm^2 , a TNT vapor concentration of 10^{-14} g/cm^3 can be recorded, which is equal to the threshold vapor concentration for modern gas analytical detectors of objects containing TNT.

Evaluation of the TNT evaporation dynamics can be used to determine the time after which TNT microtraces can be detected on the objects that have been in contact with TNT.

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