SOLID PHASE EXTRACTION AND GAS CHROMATOGRAPHY-MASS SPECTROMETRIC ANALYSIS OF TRIACETONE TRIPEROXIDE (TATP)

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Incidents involving the use of the cyclic peroxide-based explosive, triacetone triperoxide (TATP), alarmingly continue [1], the latest being the bombing of London subway trains [2]. TATP has become an illicit explosive of choice due to its straightforward synthesis using readily available precursor chemicals, acetone and hydrogen peroxide [3]. Its extreme sensitivity to friction, shock, and impact makes it unfavorable for many commercial or military uses [4]; however, the ease of synthesis from readily available chemicals, the simple requirements of preparation, and the detonation effect attract much interest in criminal and terrorist activities. TATP detection represents a serious challenge because conventional explosive detection devices used for airport security rely on the presence of nitro groups or metallic elements for a positive response [5]. Due to its high vapor pressure, TATP can be analyzed with air sampling techniques.

In this study, TATP was synthesized according to the literature [6] and solid phase extraction (SPE) of TATP was investigated using LiChrolut EN. Initially, TATP samples were prepared in the range of 0.2 mg L\(^{-1}\) - 2 mg L\(^{-1}\) and analyzed with Gas Chromatography-Mass Spectrometry (GC-MS) method to prepare a calibration curve. The obtained calibration equation was: Peak Area = 2.0\(\times\)10\(^6\) c + 5.6\(\times\)10\(^4\) (c: mg L\(^{-1}\) TATP concentration). The system designed for TATP is based on extracting TATP from a matrix media by exploiting its sublimation properties. Since TATP recovery is difficult from post explosion debris, collecting TATP vapor into a column is achieved with such design. A known amount of TATP sample in a watch glass was placed into SPE apparatus. TATP vapor was collected in the column by placing SPE column in front of the suction cup for 60 min. The column was eluted with acetonitrile after the procedure and eluate was injected into GC-MS. Preliminary results showed that 44 % of the TATP was retained by Lichrolut EN column.

KEYWORDS: Cyclic Peroxide-Based Explosive, Triacetone Triperoxide (TATP), solid phase extraction, Gas Chromatography-Mass Spectrometry (GC-MS)

REFERENCES: