



Design and invent explosives detection system based on smartphone

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In the decade of the 21th century, the number of terrorism have been enhanced. TNT or 2,4,6-trinitrotoluene is well-known explosive substance. This research is focused on the development of TNT detection system by using a dispersive liquid-liquid microextraction (DLLME) technique combined with colorimetric assay that used smartphone as a detection unit. The Meisenheimer anion is produced in the reaction of TNT and sodium hydroxide, after that, this anion was performed in the ion-pairing with trioctylmethylammonium ion (TOMA) in 200 μL of carbon tetrachloride and the red product was obtained. A preconcentration factor of 50 was obtained in this method. The PMMA housing for sample compartment and smartphone platform was designed and invented. The application of android 4.2.2 system was utilized for evaluating and constructing calibration curve and the linearity was obtained in the range of 0.25-2.5 $\mu\text{g mL}^{-1}$. This system provided a limit of detection of 0.1 $\mu\text{g mL}^{-1}$ and precision of 2.4% RSD. The proposed system was successful to detect trace amount of TNT on clothing and gloves with good correlation to the commercial spectrophotometer.

Keywords: 2,4,6-trinitrotoluene (TNT); DLLME; Explosives; Smartphone