Development of cotton swab test kit for 2,4,6-trinitrotoluene detection
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Abstract: Nowadays, TNT (2,4,6-trinitrotoluene) is one of the most popular explosives substance in the 21th century. The detection of 2,4,6-trinitrotoluene explosives has attracted enormous attention due to their importance in homeland and international security, forensics applications, and environmental assays. This work is focused on qualitative and semi-quantitative of TNT using cotton swab test kit based on colorimetric detection by naked eyes. The screening method is based on the reaction of TNT in alcohol reacted with a strong base, and the red product was presented immediately on the cotton swab. The test kit was used to demonstrate the rapid qualitative and semi-quantitative analysis of TNT (0, 5, 10, 20 and > 30 µg). Furthermore, for higher precision and accuracy, the smartphone has been used to capture digital image of the colour product inside the photographic box. The calibration curve was constructed between log TNT (µg) vs. color intensity, and it was linear in the range of 1-30 µg-TNT with R² 0.9975. The limit of detection (3.3σ/slope) was 0.11 µg-TNT and percentage relative standard deviation (%RSD, n=10) was 2.30 %. The cotton swab test kit was kept in alumina foil coated in side with LDPE. A box of TNT test kit consisted of 12 pieces of cotton swab. Estimated cost of test kit per box is about 100 baht.

Keywords: 2,4,6-Trinitrotoluene (TNT); Test kit; Smartphone