

# Author's Accepted Manuscript

Indirect Determination of Pentaerythritol Tetranitrate (PETN) with a Gold Nanoparticles-based Colorimetric Sensor

Ayşem Üzer, Uğur Yalçın, Ziya Can, Erol Erçağ, Reşat Apak



[www.elsevier.com/locate/talanta](http://www.elsevier.com/locate/talanta)

PII: S0039-9140(17)30684-7  
DOI: <http://dx.doi.org/10.1016/j.talanta.2017.06.049>  
Reference: TAL17668

To appear in: *Talanta*

Received date: 24 February 2017  
Revised date: 15 June 2017  
Accepted date: 18 June 2017

Cite this article as: Ayşem Üzer, Uğur Yalçın, Ziya Can, Erol Erçağ and Reşat Apak, Indirect Determination of Pentaerythritol Tetranitrate (PETN) with a Gold Nanoparticles-based Colorimetric Sensor, *Talanta*, <http://dx.doi.org/10.1016/j.talanta.2017.06.049>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Indirect Determination of Pentaerythritol Tetranitrate (PETN) with a Gold****Nanoparticles–based Colorimetric Sensor**Ayşem ÜZER<sup>a\*</sup>, Uğur YALÇIN<sup>a</sup>, Ziya CAN<sup>a</sup>, Erol ERÇAĞ<sup>b</sup>, Reşat APAK<sup>a,c</sup>

<sup>a</sup>Analytical Chemistry Division, Chemistry Department, Faculty of Engineering, Istanbul University, 34320 Avcılar, Istanbul, Turkey

<sup>b</sup>Researcher was a staff member of Istanbul University at the initiation of this work

<sup>c</sup>Turkish Academy of Sciences (TUBA) Piyade st. No: 27, 06690 Çankaya Ankara, Turkey

\*Corresponding author. auzer@istanbul.edu.tr

**Abstract**

Pentaerythritol tetranitrate (PETN) is the nitrate ester of pentaerythritol, used as an energetic and filling material for military and civilian purposes and rarely for terrorist actions. As there is no reliable nano-colorimetric method for PETN assay, we developed an indirect method based on the determination of nitrite, obtained by reduction of nitrate derived from the alkaline hydrolysis of PETN with H<sub>2</sub>O<sub>2</sub>. We colorimetrically determined the final product, nitrite, by both conventional Griess reaction and a recently developed gold nanoparticle-4-aminothiophenol-N-(1-naphthyl)-ethylenediamine (AuNP-4-ATP+NED) method. Nitramines (RDX and HMX), if present, could be degraded by alkaline hydrolysis, without affecting PETN. The analytical performance characteristics of the developed assays as molar absorptivity ( $\epsilon$ ), limits of detection (LOD) and quantification (LOQ) were:  $\epsilon=1.06\times 10^5$  L mol<sup>-1</sup> cm<sup>-1</sup>, LOD=0.03 mg L<sup>-1</sup> and LOQ=0.11 mg L<sup>-1</sup> for indirect Griess method;  $\epsilon=1.9\times 10^4$  L mol<sup>-1</sup> cm<sup>-1</sup>; LOD=0.12 mg L<sup>-1</sup> and LOQ=0.4 mg L<sup>-1</sup> for AuNP-4-ATP+NED method. Both methods were applied to a 1:1 (w/w) mixture of PETN and TNT (corresponding to the composition of military explosive ‘Pentolite’). In order to eliminate the interference from TNT, the Meisenheimer anion of TNT formed in alkaline medium was retained on a strongly

Download English Version:

<https://daneshyari.com/en/article/5140880>

Download Persian Version:

<https://daneshyari.com/article/5140880>

[Daneshyari.com](https://daneshyari.com)