



## Method development for quantitative analysis of uric acid in urine using an 'in-house' LED spectrometer

Arjinarong Mathaweesansurn<sup>1,2\*</sup>, Natthaphon Surapanworawate<sup>1,2</sup>,  
Treerat Troangjaroensub<sup>1,2</sup>, Napasorn Chatapattama<sup>1,2</sup>,  
Noppadol Maneerat<sup>3</sup>, Nathawut Choengchan<sup>1,2</sup>

<sup>1</sup>*Flow Innovation-Research for Science and Technology Laboratories (FIRST Labs),*

<sup>2</sup>*Applied Analytical Chemistry Research Unit, Department of Chemistry, Faculty of Science,  
King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520 Thailand*

<sup>3</sup>*Department of Control Engineering, Faculty of Engineering, King Mongkut's Institute of  
Technology Ladkrabang, Bangkok 10520 Thailand*

\*e-mail: a.mathawee@live.com

In this work, the non enzyme-based method for quantitative analysis of uric acid in urine using the 'in house' light emitting diode (LED) spectrometer is presented. Detection chemistry is based on the colorimetric reaction between uric acid and phosphotungstic acid in the presence of sodium carbonate. Blue-colored product is developed and its corresponded absorbance is monitored by the LED spectrometer. Analytical performances of the method using the LED spectrometer were investigated. Working range from 4.46 to 62.44 mg/dl uric acid was observed with good linearity ( $R^2 > 0.99$ ). The method also provided good precision (RSD: 2.89 to 5.69 %) and accuracy (Analytical recovery: 88 to 95 %). The limit of detection ( $y_B+3S_B$ ) and the limit of quantitation ( $y_B+10S_B$ ) were found at 2.33 and 7.38 mg/dl uric acid, respectively. The method was applied to spiked urine samples collected from normal volunteers. The results obtained by the LED spectrometer and by the UV-Vis spectrophotometer were not significant difference by paired *t*-test at 95 % confidence ( $t_{stat.} = 2.08$ ,  $t_{cri.} = 2.15$ ). These results implied that the method based on using LED spectrometer gave high accuracy and high precision for the quantitative analysis of uric acid in urine sample.

**Keywords** In-house LED spectrometer; Uric acid; Non enzyme-based method; Quantitative analysis