A rapid and specific colorimetric method for free tryptophan quantification

Yinan Wu, Tianmin Wang, Chong Zhang, Xin-Hui Xing

www.elsevier.com/locate/talanta

PII: S0039-9140(17)30822-6
DOI: http://dx.doi.org/10.1016/j.talanta.2017.08.002
Reference: TAL17798

To appear in: *Talanta*

Received date: 7 May 2017
Revised date: 28 July 2017
Accepted date: 1 August 2017

Cite this article as: Yinan Wu, Tianmin Wang, Chong Zhang and Xin-Hui Xing, A rapid and specific colorimetric method for free tryptophan quantification *Talanta,* http://dx.doi.org/10.1016/j.talanta.2017.08.002

A rapid and specific colorimetric method for free tryptophan quantification

Yinan Wu[1], Tianmin Wang[1], Chong Zhang[*], Xin-Hui Xing

MOE Key Laboratory for Industrial Biocatalysis; Department of Chemical Engineering; Center for Synthetic & System Biology, Tsinghua University, Beijing 100084, China

[*]Corresponding author: chongzhang@mail.tsinghua.edu.cn

Abstract:

Tryptophan is one of the eight essential amino acids and plays an important role in many biological processes. For its interaction with human health, environment and relevant commercial interest in biotechnology-based production, rapid and specific quantification method for this molecule accessible to common laboratories is badly needed. We herein reported a simple colorimetric method for free tryptophan quantification with 96-well-plate-level throughput. Our protocol firstly converted tryptophan to indole enzymatically by purified tryptophanases and then used reactivity of indole with hydroxylamine to form pink product with absorption peak at 530 nm, enabling the quantification of tryptophan with simple spectrometry in just two hours. We presented that this method exhibited a linear detection range from 100 μM to 600 μM (R^2= 0.9969) with no detection towards other naturally occurring tryptophan analogs or tryptophan residues in proteins. It was very robust in complicated biological samples, as demonstrated by quantifying the titer of 36 mutated tryptophan-producing strains with Pearson correlation coefficient of 0.93 in contrast to that measured by high performance liquid chromatography (HPLC). Our

[1] These authors contributed equally to the work