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Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem



Studying the denaturation of bovine serum albumin by a novel approach of difference-UV analysis



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ARTICLE INFO

Article history:

Received 21 March 2016

Received in revised form 14 July 2016

Accepted 23 July 2016

Available online 25 July 2016

Keywords:

Difference-UV spectroscopy

BSA

Heat denaturation

GdHCl

Activation energy

DSC

ABSTRACT

A novel approach in the analysis of difference-UV spectrophotometric data for determining the heat denaturation degree of bovine serum albumin (BSA) was assessed. Five different parameters of difference-UV spectra were obtained by subtracting spectra of unheated and denatured protein solutions at different temperature-time combinations. BSA was found to exhibit a maximum degree of heat denaturation of about 17% compared to the complete unfolding caused by 6 M guanidine hydrochloride. This low degree of heat denaturation is probably caused by the aggregation of the initially unfolded protein molecules. The kinetic analysis exhibited discontinuities in the Arrhenius plots, distinguishing the unfolding and aggregation phases of the denaturation process, whereas such a discrimination could not be obtained by differential scanning calorimetry analyses. The proposed method is accurate, fast, simple and sensitive enough to detect changes in the protein heat denaturation even at short temperature-time intervals.

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