

Accepted Manuscript

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PII: S0167-7322(17)35653-2
DOI: doi:[10.1016/j.molliq.2018.05.035](https://doi.org/10.1016/j.molliq.2018.05.035)
Reference: MOLLIQ 9090
To appear in: *Journal of Molecular Liquids*
Received date: 23 November 2017
Revised date: 7 May 2018
Accepted date: 8 May 2018

Please cite this article as: Zaheer Khan, Shaeel Ahmad Al-Thabaiti , Micellization and aggregation behavior of crocin with bovine serum albumin: A biophysical study. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.05.035](https://doi.org/10.1016/j.molliq.2018.05.035)

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Micellization and aggregation behavior of crocin with bovine serum albumin: A biophysical study

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Abstract

The interaction of bovine serum albumin (BSA) with a naturally occurring surfactant (trans-crocetin di-(β -D-gentiobiosyl) ester, crocin) was studied under biophysical conditions by using various techniques such as surface tensiometry, UV-visible spectrophotometry and fluorescence. Upon the addition of a small amount of BSA, the λ_{max} of a crocin dispersion in water shifted to lower wavelengths, indicating either a ground state complex formation between BSA and crocin or solubilization of BSA into the micelles of crocin. The critical micelle concentration (cmc) of crocin decreases in the presence of increasing BSA concentrations. The complex formation constant (K_C), surface pressure π_{cmc} , maximum surface excess (Γ_{max}), the minimum surface area per molecule (A_{min}), enthalpy (ΔH^0), entropy (ΔS^0), and Gibbs free energy change (ΔG^0) were calculated for the BSA-crocin interactions. BSA fluorescence was quenched in the presence of crocin. The fluorescence data were used for determining the apparent association constant (K_{app}), the Stern-Volmer constant (K_{SV}), the bimolecular rate constant of the quenching process (k_q) and the thermodynamic parameters.

Keywords: Protein interaction; Bola surfactant; Surface parameters; Crocin

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