

## Accepted Manuscript

Mode of action of betaine on some amino acids and globular proteins: Thermodynamic considerations

Anu A. Thoppil, Eva Judy, Nand Kishore

PII: S0021-9614(17)30090-3  
DOI: <http://dx.doi.org/10.1016/j.jct.2017.03.025>  
Reference: YJCHT 5019

To appear in: *J. Chem. Thermodynamics*

Received Date: 10 January 2017  
Revised Date: 22 March 2017  
Accepted Date: 23 March 2017

Please cite this article as: A.A. Thoppil, E. Judy, N. Kishore, Mode of action of betaine on some amino acids and globular proteins: Thermodynamic considerations, *J. Chem. Thermodynamics* (2017), doi: <http://dx.doi.org/10.1016/j.jct.2017.03.025>

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 proof before it is published in its final 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.



**Mode of action of betaine on some amino acids and globular proteins:  
Thermodynamic considerations**

Anu A. Thoppil, Eva Judy, Nand Kishore\*

*Department of Chemistry, Indian Institute of Technology Bombay, Powai, Mumbai – 400076, India*

\*Corresponding author: *E-mail address:* nandk@chem.iitb.ac.in (N. Kishore)

The interactions of the amino acids glycine, L-alanine, DL- $\alpha$ -amino-n-butyric acid, L-valine, and L-leucine have been studied based on values of apparent molar volume ( $V_{2,m,\phi}$ ) and apparent molar compressibility ( $K_{s,2,m,\phi}$ ) in 1 mol·kg<sup>-1</sup> and 2 mol·kg<sup>-1</sup> aqueous betaine solutions at  $T = 298.15$  K. These thermodynamic quantities have been calculated from density and sound velocity measurements. Isothermal titration calorimetry has been employed to determine the values of enthalpies of interaction of aqueous solutions of these amino acids with betaine. These data have been further used to calculate values of infinite dilution standard partial molar volumes ( $V_{2,m}^{\circ}$ ), standard partial molar isentropic compressibilities ( $K_{s,2,m}^{\circ}$ ) and limiting enthalpies of dilution ( $\Delta_{dil}H_m^{\circ}$ ) of these amino acids in aqueous betaine solutions. The standard partial molar volumes of transfer ( $\Delta_{tr}V_{2,m}^{\circ}$ ), isentropic compressibilities of transfer ( $\Delta_{tr}K_{s,2,m}^{\circ}$ ) and enthalpies of dilution of transfer  $\Delta_{tr}(\Delta_{dil}H_m^{\circ})$  of amino acids from water to aqueous betaine solutions have been calculated from the measured data in order to understand possible intermolecular interactions such as ion-ion, ion-polar, hydrophilic-hydrophobic and hydrophobic-hydrophobic group interactions. The contributions of the end groups  $\{(\text{NH}_3^+, \text{COO}^-), \text{CH}_2$  groups and the other alkyl chains of the amino acids to  $V_{2,m}^{\circ}\}$  have also been determined. The interactions of betaine with the globular proteins  $\alpha$ -lactalbumin and bovine serum albumin have also been studied. Such studies are important in obtaining information on the action of osmolytes on proteins and their constituents and establishing possible correlations.

**Keywords:** amino acids,  $\alpha$ -lactalbumin, bovine serum albumin, betaine, partial molar volume and compressibility, enthalpy of dilution.

Download English Version:

<https://daneshyari.com/en/article/4907323>

Download Persian Version:

<https://daneshyari.com/article/4907323>

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