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INCLUSION COMPLEX OF GLUTAMINE - UV METHODS

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ABSTRACT

The reaction mixture was scanned in the ultraviolet and visible regions on Perkin Elmer LS 25 UV spectrophotometer for absorption studies. The absorption spectra were used to confirm the formation of inclusion complex.. The values of stability constant were calculated by varying [glutamine] keeping the parameters as [sodium acetate]; [H^+]; [β-cyclodextrin] was kept constant.

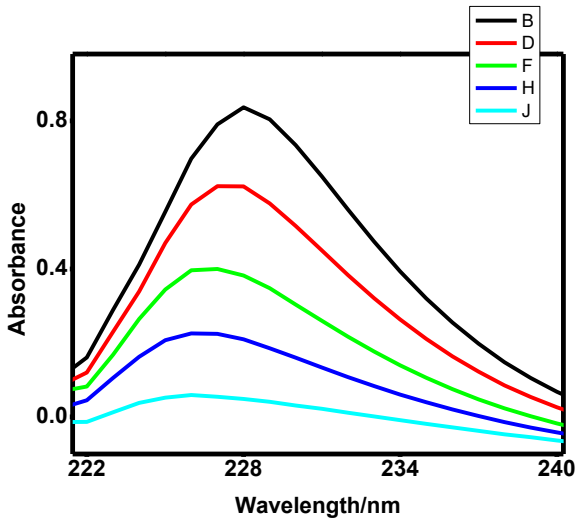
KEY WORDS, Glutamine , peroxomonosulphate (PMS), β-cyclodextrin (β-CD) catalyst, inclusion complex, UV spectra

1.0 Introduction

Histidine is one of the 22 proteinogenic amino acids. In terms of nutrition, Histidine is considered an essential amino acid in human infants. After reaching several years of age, humans begin to synthesize it, at which point it becomes a non-essential amino acid [1].Cyclodextrins with six to eight α-D-glucopyranose units are denoted as α- ß- and γ-cyclodextrins [2]. The kinetics of cleavage of phenyl phenyl acetates (PPA) and several para-substituted PPAs in basic aqueous sodium carbonate–bicarbonate buffer containing β-cyclodextrin (β-CD) [3]. The most important characteristics of CDs are the formation of inclusion complexes with various organic and inorganic guest molecules [4-7]. The inclusion complex of these host–guest systems occurs through various interactions, such as hydrogen bonding, van der Waals interaction, hydrophobic interactions and also electrostatic attraction [8].

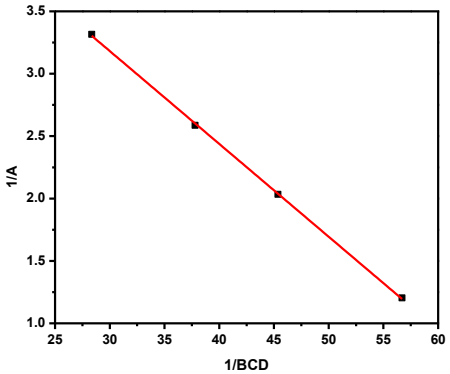
2.0 Experiments

The concentrations of β- CD have been assigned as 500 mg and concentrations of L-glutamine have been assigned as 50 mg. There was a linearly decrease in the absorbance with the series of (0,5ml,1ml,1.5ml,2.0ml) by the successive addition of glutamine . (Figure 3.11). There was also shift in the λ_{max} from 216nm to 219nm. Whereas, inclusion complex had a decreased intensity at all points of wavelength due to the interaction of β-CD and glutamine. It is observed that, the absorbance value decreased with increasing β-CD concentrations while the concentration of glutamine remains the same. It indicates that the solubility of glutamine increases upon forming the inclusion complex. The inclusion complex can be proved that the plots of 1/A vs. [1/ β-CD] were linear. A very good linear relationship was obtained for 1/A vs. [1/ β-CD]. This linear plot clearly indicates that the stability constant values of glutamine are 100.6M^{-1}.The stoichiometry ratio for the inclusion complex formation between glutamine and β-CD is 1:1.



3.11Absorption spectra of glutamine with various concentration of β-CD

$[H^+]$ = 5 x 10^{-1} M; [sodium acetate] = 8.5 x 10^{-2} M ; [β-cyclodextrin] = 50mg[glutamine] =500mg



Reciprocal plot for [1/A] against [1/β–CD] of glutamine inclusion complex

$[H^+]$ = 5 x 10^{-1} M; [sodium acetate] = 8.5 x 10^{-2} M ; [β-cyclodextrin] = 50mg [glutamine] =500mg

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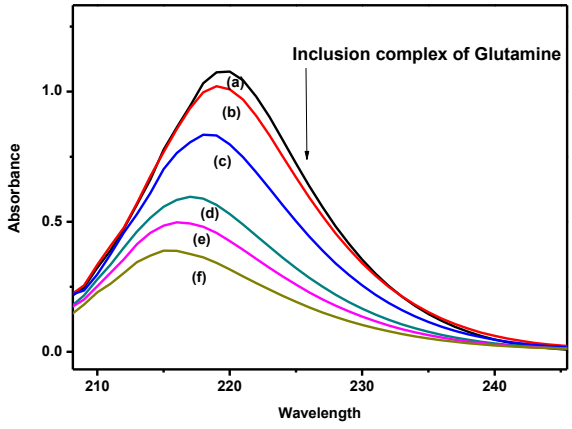
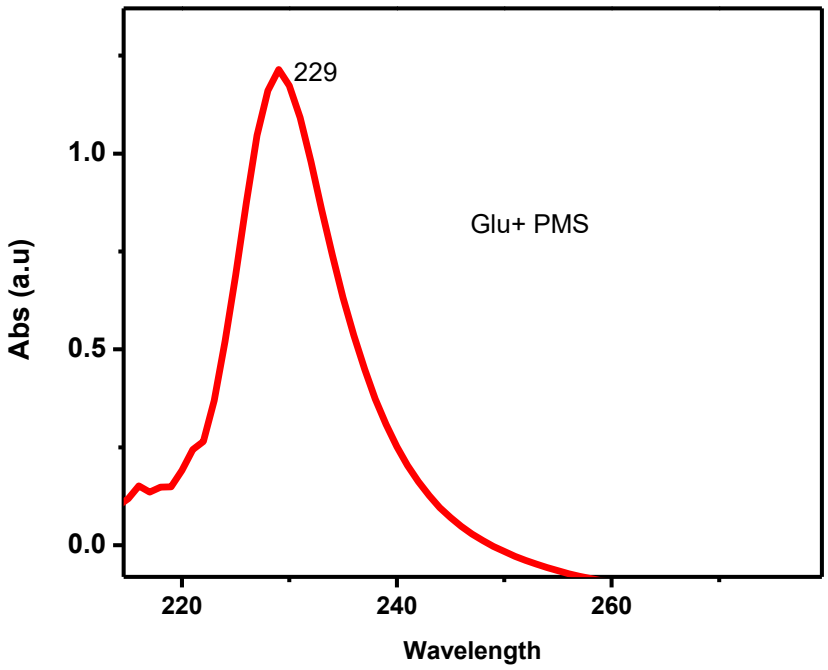


Figure 3.13 Absorption spectra of glutamine with various concentration of β-CD

$[H^+]$ = 5 x 10^{-1} M; [sodium acetate] = 8.5 x 10^{-2} M ; [β-cyclodextrin] = 50mg [glutamine] =500mg

2.1 Effect of PMS

By varying [PMS] the other parameters as [glutamine]; $[H^+]$; [sodium acetate] ; [β-cyclodextrin]; was kept constant. The addition of PMS in the reaction mixture, the intensity slightly increases and the absorbance of wavelength remains constant. The maximum absorbance of wavelength is 229nm. This is due to the presence of the guest (glutamine) and the host (β-cyclodextrin) was broken down.



Absorption spectra of glutamine with various concentrations of [PMS]

$[H^+]$ = 5 x 10^{-1} M; [sodium acetate] = 8.5 x 10^{-2} M ; [β-cyclodextrin] = 50mg [glutamine] =500mg ; [PMS] = 3.90 x 10^{-3} M

Studies of stability constant:

The values of stability constant were calculated by absorption spectra of varying [β-CD] keeping the parameters as [sodium acetate]; $[H^+]$; [amino acid] was kept constant. It is observed that, the absorbance value decreased with increasing β-CD concentrations while the concentration of amino acid remains the same. It indicates that the solubility of [glutamine] increases upon forming the inclusion complex. The inclusion complex can be proved that the plots of 1/A vs. [1/ β-CD] were linear, the slope values of glutamine was 0.04617 and the intercept values 4.62985. The stability constant values of glutamine 100.6

Effect of stability constant

S.No.	$1/\beta$ CDM^{-1}	$1/AM^{-1}$ Glutamine
1.	72	1.2
2.	56	2.03
3.	38	2.7
4.	32	3.31

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