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Subject**:** Chemistry

Title of thesis: Interaction of amino acids with carbohydrates and biologically important dyes in aqueous medium.

ABSTRACT

Proteins are the most vital of all the biological molecules evolved for a variety of specific purposes. To be functional and active, a very specific three dimensional structure is required. An array of vital forces, i.e., hydrophobic interactions, hydrogen bonding, ionic interactions, van der Waals interactions constitute the main forces responsible for the specific structure and conformation of proteins. Due to complex structure of proteins their direct study is somewhat difficult. Therefore, the most convenient method is to study the structural units (or monomers), i.e. amino acids and peptides of the proteins to get insight into the fine structural details of these biopolymers.

Amino acids as structural components of proteins participate in all the physiological processes of a living cell. Therefore, many physical and chemical studies have been done to elucidate interaction mechanisms between amino acids and organic compounds in cell fluids or compounds with the same functional groups as those existing in biomolecules of living organisms. The study of model compounds (amino acids and peptides) in aqueous solutions is of fundamental importance in understanding intermolecular interaction in liquid and the effect of these compounds on water structure. These studies have been carried out by a number of researchers

In living organisms, proteins (in other words their constituents – amino acids) interact with carbohydrates and this interaction has been recognised to play a key role in a wide range of biochemical processes. This has attracted the attention of many investigators all over the world. Some investigators have studied the interaction of amino acids in aqueous, aqueous electrolyte, aqueous organic liquid mixtures, aqueous organic salts, aqueous urea, and in aqueous surfactants using volumetric or viscometric or calorimetric methods. An extensive literature survey indicates that studies on amino acid – carbohydrate interaction in aqueous solution are rare. Further, to the best of our knowledge no thermodynamic and transport studies on amino acid - carbohydrate interactions in aqueous medium have been reported using volumetric, viscometric and refractive index methods.

Therefore, we feel that complete knowledge of amino acid – carbohydrate interaction in aqueous medium is essential for a clear understanding of solution properties of these biomolecules. In addition to this, we intend to study the interaction of amino acids and peptides with biologically important dyes/ tartrazine.

Tartrazine (known as E 102 / FD and C yellow 5) is a synthetic lemon yellow azo dye used in food colouring. Commercially, it is used in cake mixes, custard powder, soups, sauces , ice-cream, candy, marzipan, jam, jelly, gelatins, mustards, certain brands of fruit squashes, fruit cordial and soft drinks, and in many convenient foods together with glycerine, lemon and honey products. Besides food products tartrazine has also got its applications in drugs especially shells of medicinal capsules, syrups and also in cosmetics.

In the present study, we investigate the physico – chemical interactions of amino acid/ peptides with carbohydrates (monosaccharides and disaccharides)/ dye (tartrazine) in aqueous solution.