SUMMARY OF THE WORKS DONE

CHAPTER I

This chapter covers the object and applications of the research work, brief discussion about bioactive compounds, the solvents and solutes used and methods of investigations.

CHAPTER-II

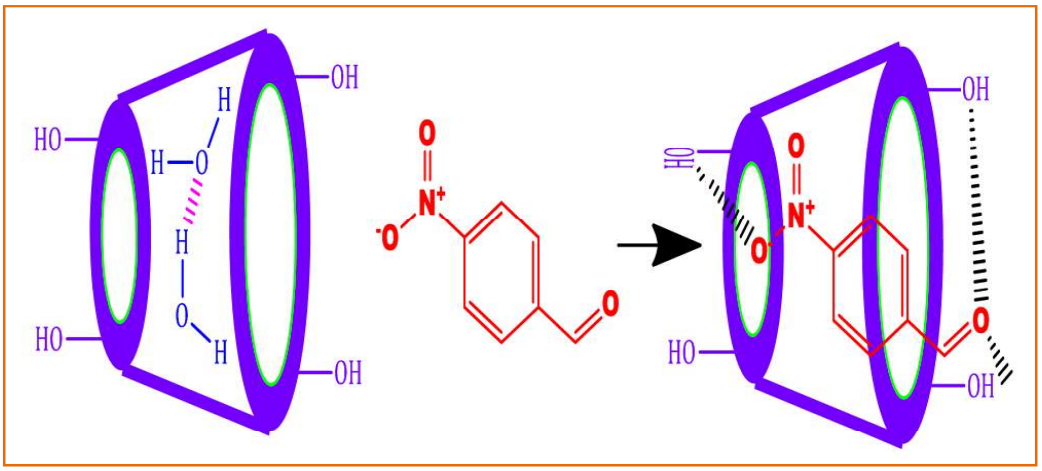
This chapter comprises the broad introduction of the. A brief review of earlier works in the arena of solute-solvent interaction has been given. The origin of various kinds of interactions such as includes solute-solvent, solute-solute and solvent-solvent interactions are discussed in the light of different parameters obtained from conductance, density, viscosity, ultrasonic speed, and refractive index measurements. The mathematical derivations made by renowned scientists are presented briefly for better understanding the origin of these intermolecular interactions prevailing in solutions.

CHAPTER-III

This chapter covers the experimental section of research works. The structure, source, method of purification and application of the solvents and solutes used research purposes are discussed briefly. In the methodologies part, the various tools used for conductance, density, viscosity, ultrasonic speed, and refractive index measurements are discussed concisely.

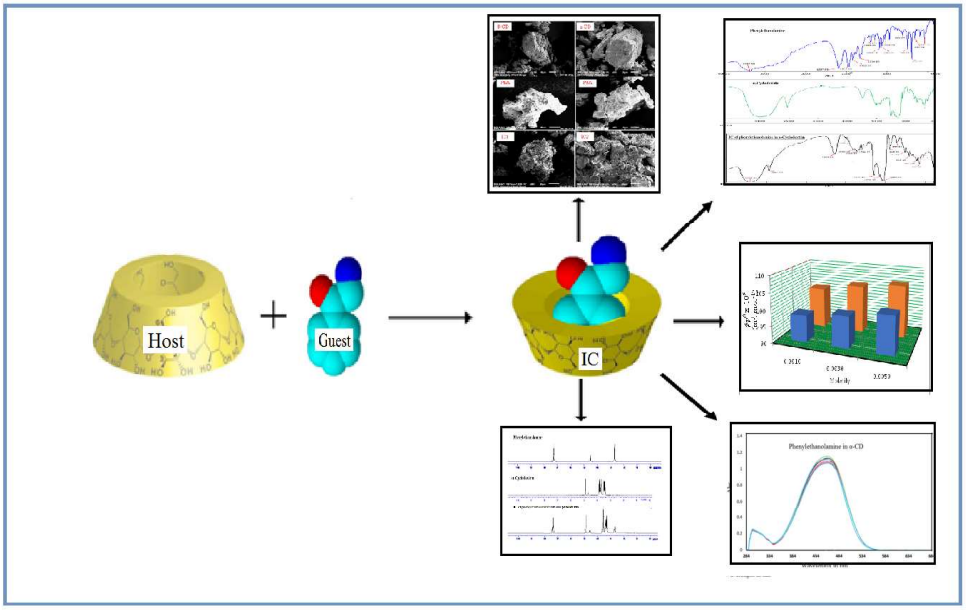
CHAPTER-IV

The host–guest interaction of p-nitro benzaldehyde(PNB) as guest and β-Cyclodextrins as a host have been investigated which have significant applications in the field of medicine such as controlled drug delivery. The ^{1}H NMR results confirms the formation of inclusion complex while surface tension and conductivity studies support the formation inclusion complex with 1:1 stoichiometry. The stoichiometry of the inclusion complex was also supported with Job's plot method by UV-Visible spectroscopy. FT-IR spectral data and SEM analysis also support the inclusion process. Association constants of the inclusion complexes(IC) have been estimated using the Benesi–Hildebrand equation, while the different important thermodynamic parameters have been estimated with the help of van't Hoff equation.



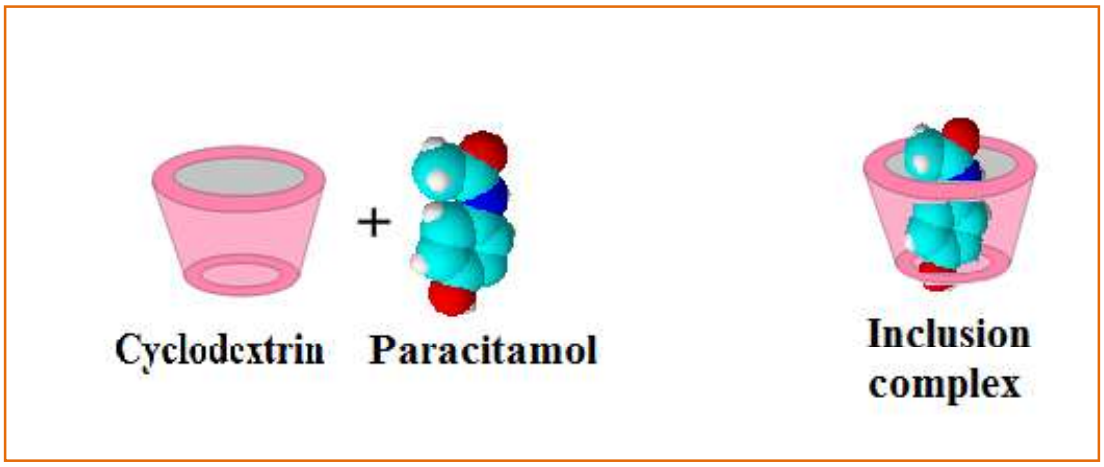
CHAPTER-V

In the present work, the formation of inclusion complex of a neurotransmitter, phenylethanolamine with α-cyclodextrin (α-CD) and β-cyclodextrin (β-CD) was examined from volumetric, viscometric and spectroscopic studies. The supramolecular interaction between cyclodextrin and phenylethanolamine has been characterized by volumetric and viscometric and spectral studies. However, the stoichiometry of host - guest of the inclusion complexes was ascertained from Job's plot calculation from UV-visible spectroscopy. The association/binding constant of formation of inclusion complex was calculated from Benesi-Hildebrand equation. The infra-red (IR) and ^{1}H NMR spectroscopy also support the formation of inclusion complexes and the probable manner of inclusion was defined from ^{1}H NMR and 2D ROESY NMR spectroscopies.



CHAPTER-VI

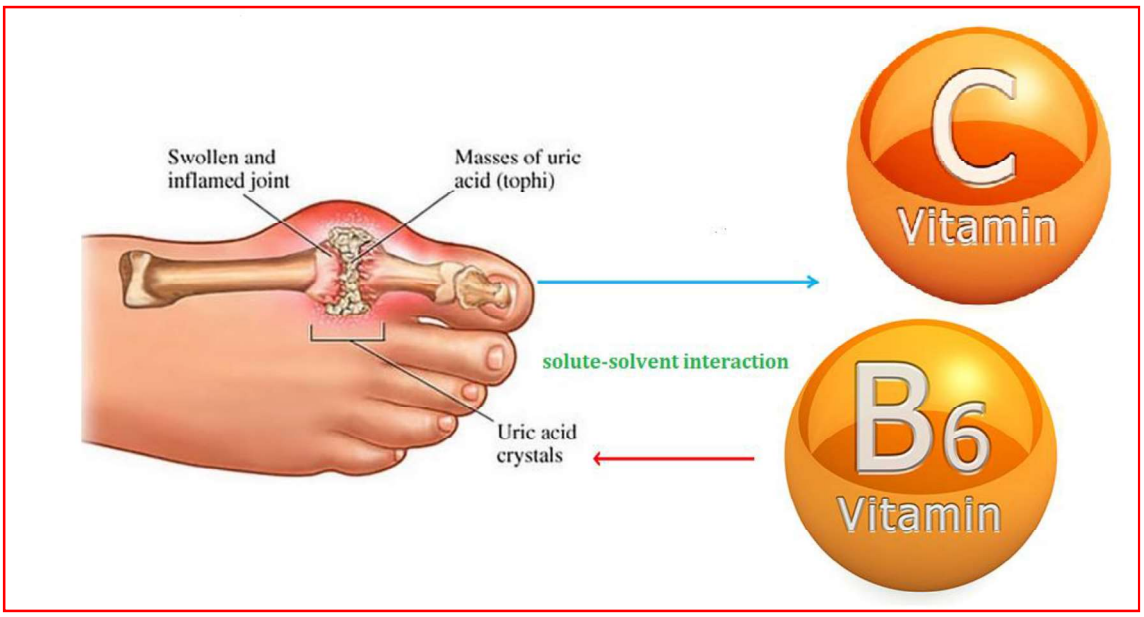
The densities and viscosities of paracetamol in aqueous □-cyclodextrin solutions with several molal concentrations m = (0.001 - 0.007) $\mathrm{mol \cdot kg^{-1}}$ of □-cyclodextrin were determined at T = (298.15- 318.15) K under atmospheric pressure. The inclusion has been studied using uv-vis spectroscopy. Using experimental data apparent molar volume (ϕ_V), standard partial molar volume (ϕ_V^0), the slope (S_V^*), standard isobaric partial molar expansibility (ϕ_E^0) and its temperature dependence $(\partial\phi_E^0/\partial T)_P$, the viscosity *B*-coefficient and solvation number (S_n), *etc*., were determined. Free energies of activation of viscous flow per mole of the solvents ($\Delta\mu_1^{0\neq}$) and of the solute ($\Delta\mu_2^{0\neq}$) are also calculated. Various results revealed that the solutions are characterized predominantly by solute -solvent interactions and paracetamol behaves as a long-range structure maker.



CHAPTER-VII

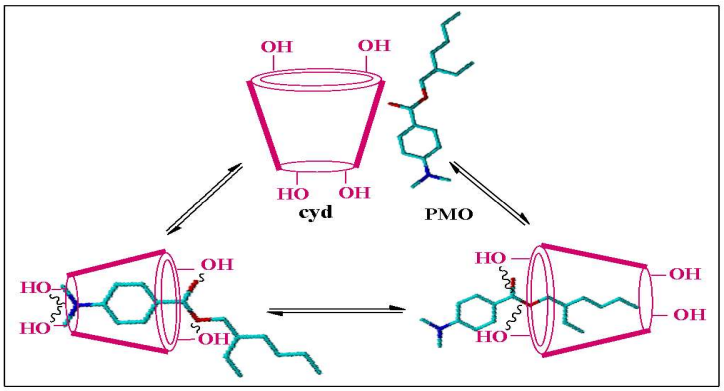
Pyridoxal phosphate (PLP), the active form of vitamin B_6, is a coenzyme in a variety of enzymatic reactions. The High blood concentrations of uric acid crystals can cause gout . Therefore these PLP and uric acid's ion-solvent interactions in aqueous system can lead to the dissolution of the excess uric acid from the body, which brings about the novelty in this paper. In order to proof the interactions and removal of excess uric acid from the body we have studied its Density, Viscosity, Refractive index, Conductance, UV-Vis, IR, 1H-NMR at three diverse temperatures. It was observed that the ion-solvent interactions dominated rather than the ion-ion interactions. Therefore these potential capacities of PLP to act as coenzyme

in various catabolic pathways will be helpful in various clinical treatments related with hyperuricemia, hypouricemia, hyperuricosuria, hypouricosuria, gout within the human body.



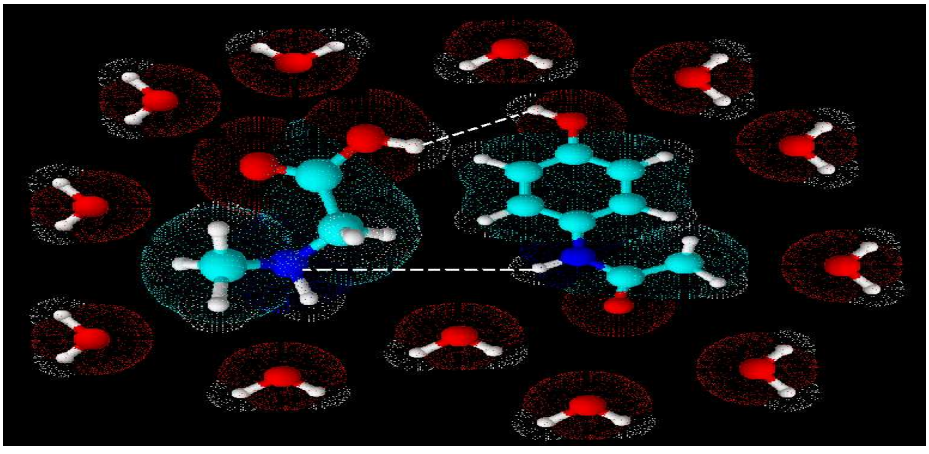
CHAPTER-VIII

Ultraviolet B (UV-B) radiation is very harmful to human body. It can cause serious health problem mainly skin cancer, sunburn and photo-aging. Padimate O (PMO) is a sunscreen agent. The aim of this work is to form inclusion complexes with α- cyd and β- cyd (Cyclic Oligosaccharides) in both aqueous environment and solid state that established by Uv-vis, FTIR spectroscopy, mass spectra, powder x-ray diffraction pattern. As α- cyd and β- cyd are known to us as good drug vehicles, hence, the experimental results suggest that they can be used as good sunscreen agent carrier and photostabilizer additive for increasing the photostability and other properties of PMO. In solution phase, Uv-vis spectroscopy demonstrated that the entire process of formation of complexes is proceeded with 1:1 stoichiometry which is further justified by mass spectra. Thermodynamic parameters support the whole process in both cases and it is revealed that β- cyd forms more firmly inclusion complex than α- cyd with PMO. Successful formation of solid inclusion complexes is supported by FTIR spectroscopy and powder-XRD. The enhancement of the thermal stability of the α- cyd /PMO and β- cyd /PMO complexes is demonstrated by TGA study.



CHAPTER-IX

The apparent molar volume (ϕ_V) and viscosity B-coefficient of N-methyl glycine of 0.01 m, 0.02 m and 0.03 m aqueous solutions have been calculated in presence of paracetamol at three temperatures namely 298.15 K, 303.15 K and 308.15 K from physicochemical study such as density (ρ) and viscosity (η) and refractive index measurements and ^{1}H NMR spectroscopy. The volumetric study was used to evaluate limiting apparent molar volumes (ϕ_V^0) and experimental slopes (S_V*) by using Masson equation for explaining solute–solvent and solute–solute interactions, respectively. The nature of group interactions between the solute, solvent and co-solute have been examined from limiting apparent molar volumes of transfer ($\Delta\phi_V^0$) values. The viscosity data were employed to determine viscosity A and B coefficients from Jones–Dole equation and the resulting parameters were used to examine the solute–solute and solute–solvent interactions in the solutions. Molar refraction values considered from refractive indices by applying Lorentz–Lorenz equation were used to describe the intermolecular interactions between N-methyl glycine and paracetamol in their aqueous solution. However, the ^{1}H NMR spectroscopy agrees about the existence of diverse interactions concretely.



CHAPTER-X

This chapter covers the concluding remarks on the works related to the thesis.