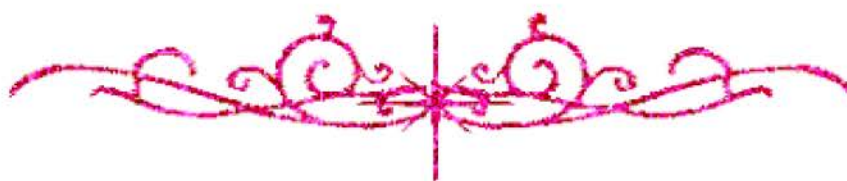


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بالرسالة صفحات
لم ترد بالأصل





THERMODYNAMIC FUNCTIONS OF ELECTROLYTE SOLUTIONS

A THESIS

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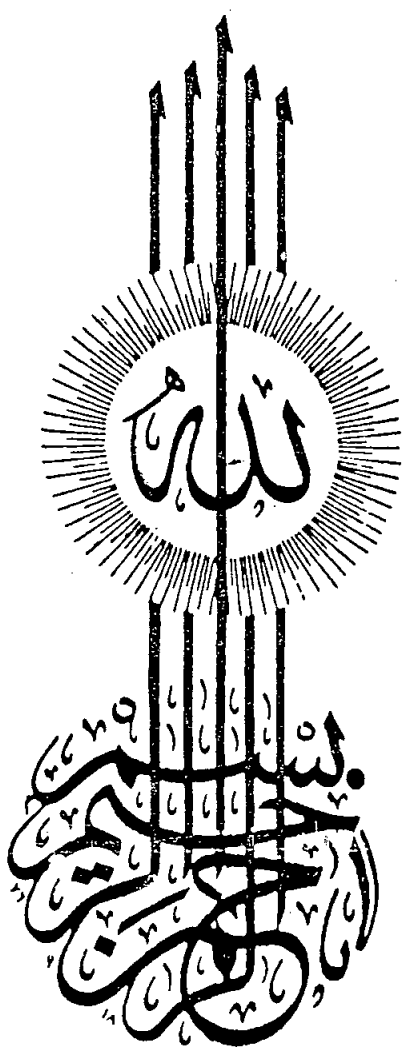
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عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمِ

وَالْحَمْدُ لِلَّهِ الْمَنَّانِ

To : *My Family*

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CHAPTER 1

INTRODUCTION

INTRODUCTION

The ionic solution basis lies in the Debye-Hückel theory⁽¹⁾ of electrolyte solution. This theory is exact in the limit of small concentrations. Many theoretical research have been made to explain the difficulties of the Debye-Hückel theory and extend it to more general models or higher concentrations. The modern statistical theory of dilute electrolytes goes back to the work of Kirkwood and Poirier,⁽²⁾ Bogoliubov,⁽³⁾ Mayer,⁽⁴⁾ Haga,⁽⁵⁾ Poirier,⁽⁶⁾ Meeron,^(7,8) Falkenhagen,⁽⁹⁾ and Kelbg⁽¹⁰⁾ and, last but not least, to the work of McMillan-Mayer.⁽¹¹⁾ The McMillan Mayer theory provides a clear framework for developing approximate calculations of the thermodynamic properties of solutions, and electrolyte solutions in particular.

The complexity of the subject of the thermodynamic functions necessitated a study of both dilute and concentrated solutions.⁽¹²⁾ The treatment of concentrated solutions had been made first by Debye and Hückel. The modern theory of ionic solutions which describes the properties of electrolytes has been developed under the law of force of attraction between ions and by specialized application of the fundamental concepts of electrostatics, hydrodynamics and statistical mechanics. Many simplified models are used to discuss the theoretical structure of electrolyte solutions with mathematical approximations in the treatment of these models.^(13,14)

The primitive model (PM) is a commonly used model for