Chemical And Biological Studies

On " Mono Sodium Glutamate "

Thesis Submitted
By
Effat Abdou Ahmed
B. Sc. M. Sc.
Nutrition Institute

To
Faculty of Women for Arts, Science and Education
Ain Shams University
For
The Degree of Ph. D .(Chemistry)

Thesis Advisors

Dr. Emtithal Ahmed Babaa El--Din . El-Sawi
Prof. of Organic Chemistry
Faculty of Women for Arts, Science and Education
Ain Shams University

Dr. Mohamed Fahmi Seddik
Prof. of Food Hygiene
Nutrition Institute

Co . Supervisor
Dr. Ahmed Shaker
Lecturer of Food Technology
Nutrition Institute

1994

Chemical and Biological studies
On " Mono Sodium Glutamate"

Thesis Advisors *Approved*

Prof. Dr. Emtithal Ahmed Bahaa El-Din El - Sawi E. El-Sawi

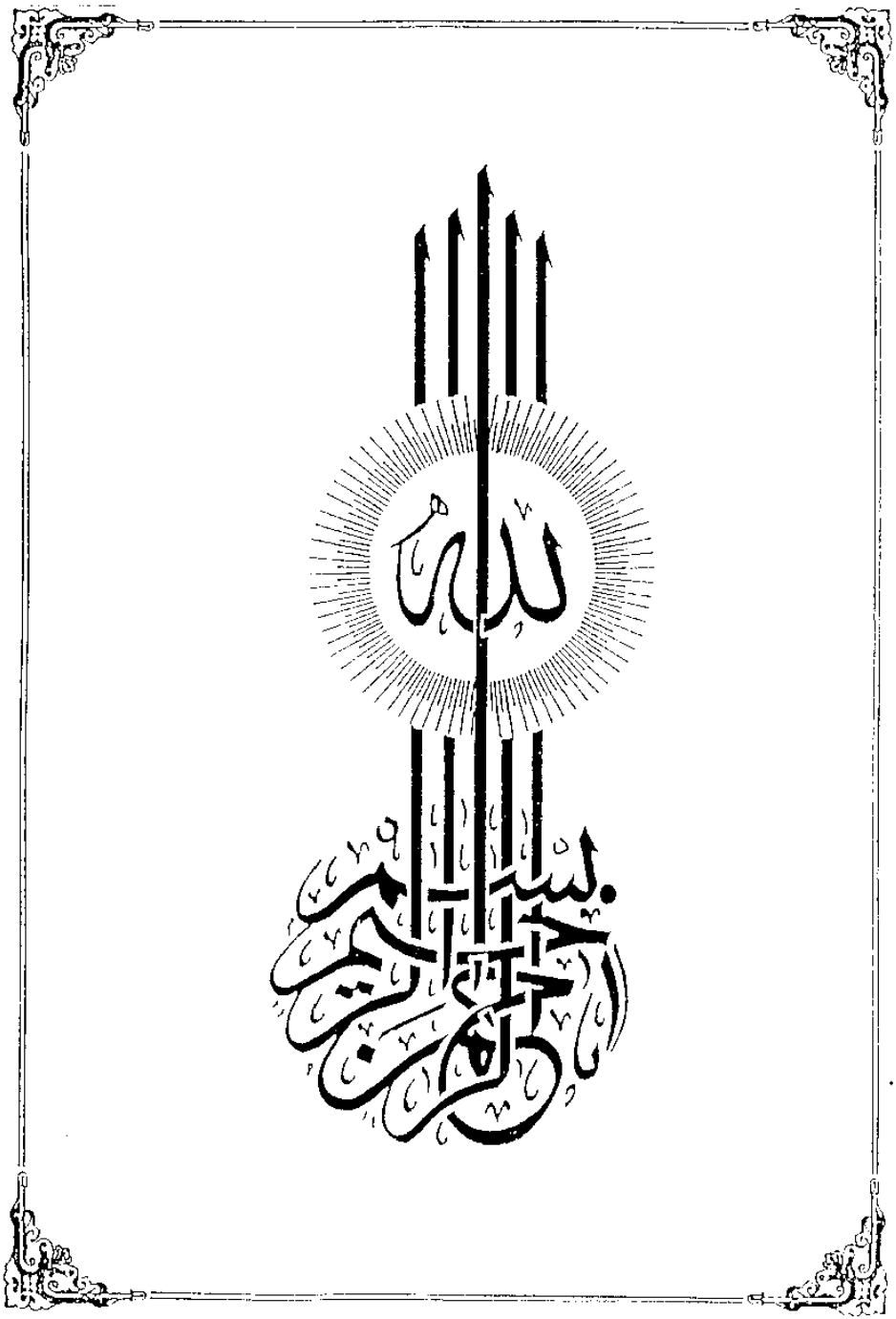
Prof . Dr . Mohamed Fahmi Seddik .....

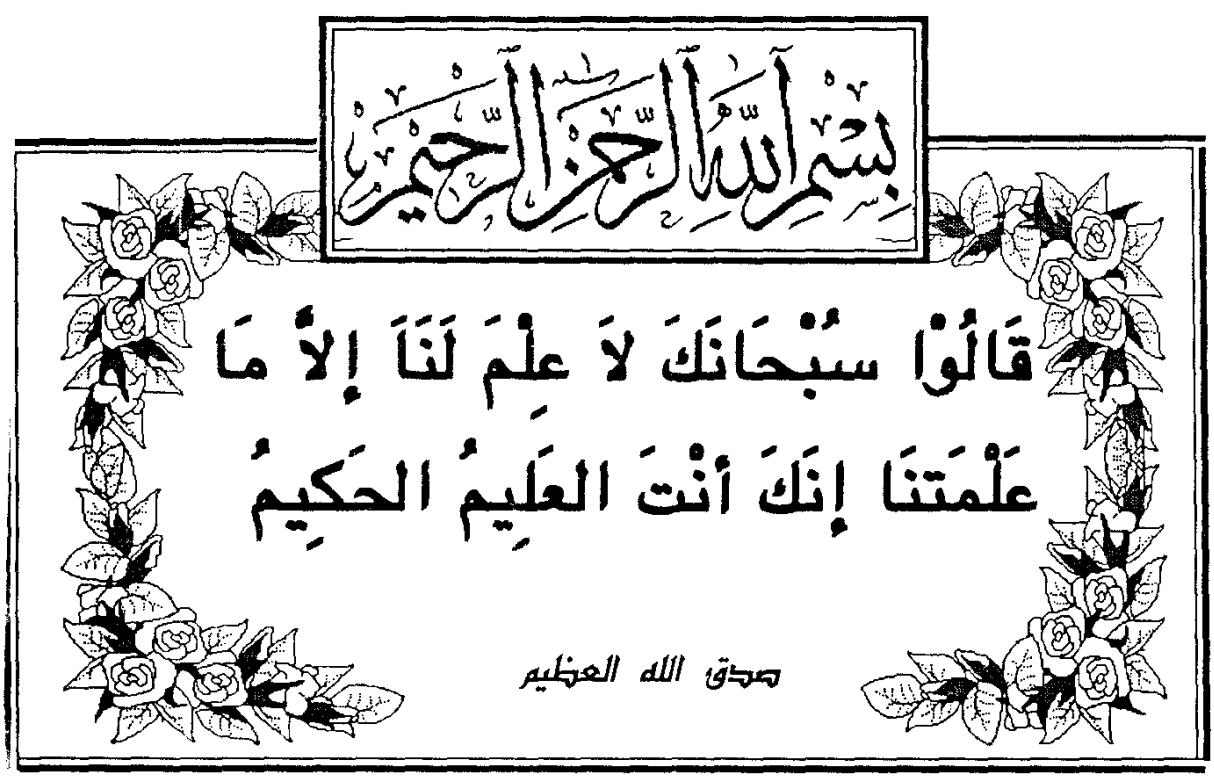
Dr. Ahmed Mohamed H. Shaker A. Shaker

Head of Chemistry Department

Marguerite A. Wassef

Prof. Dr . Marguerite Anis Wassef





Acknowledgment

I wish to express my deepest gratitude to Professor Dr . Emtithal A. El. Sawi, prof. of organic chemistry, Faculty of women , Ain Shams Unversity, for her continous help , advise and encouragement . In spite of her overcrowded time, she offered me a great help and valuable discussion that attended every stage in this work .

I am also deeply indebted to professor Dr. Mohamed Fahmi Seddik , prof. of food hygiene, Nutrition Institute , for his valuble suggestions and wise guidance that contributed to the success of the persent work . His extreme patience and untiring effort are more than I can express .

I would also like to experss my deep appreciation to Dr. Ahmed Mohamed H. Shaker, Lecturer of Food Technology , Nutrition Institute , for suppervision and support .

I gratefully appreciate the valuable help of Dr . Soheir El- Sarouni , Anatomy Department , Faculty of Medicine , Cairo University , for her unlimited help .

Finally , my deepest thanks to my family and my husband for their good received in many ways .

Content

List Of Tables

List of Figures

Legends OF Figures

Introduction

Introduction

(Food protection committee of the food and nutrition board) definied food additives as " a substance or mixture of substances,other than a basic foodstuff , which is present in a food as a result of any aspect of production , processing, storage, or packaging . The term does not include chance contamination .

"Additives can be divided into six major categories : preservatives, nutritional, additives, flavoring agents, texturizing agents, colouring agents and miscellaneous.Today, more than 2500 different additives are internationally added to foods to produce a desired effect .

Flavoring agent as a subsidiary branch of food additives comprise the greatest numbers of additives used in foods (700 substances) . There are three major types of flavoring additives : sweeteners, natural and synthetic flavors and flavor enhancers .

Flavor enhancers magnify or modify the flavor of food and don't contribute any flavor on their own and it can be definied as : a substance that added to food to supplement or enhance its original taste or flavor . The term flavor potentiator has also been used with the same meaning . [Yoshihisa 1989 (Book)] [1] .

The best known and most widely used flavor enhancer is mono sodium L - glutamate (MSG) . In 1866, a German chemist, Ritthausen, isolated glutamic acid. Later another chemist converted the acid to a sodium salt, mono sodium glutamate.

In doing their work, neither had any interest in flavor . More than 40 years later, in 1908, a Japanese chemist at the University of Tokyo, Dr. kikunae Ikeda,

discovered the flavor enhancing properties of MSG. Dr. Ikeda had set out to find out why and how a certain seaweed, " Laminaria Japonica, " affected flavor . Japanese cooks had used this seaweed for centuries to improve the flavor of soups and certain other foods. Dr. Ikeda discovered that the ingredients in the seaweed that made the difference was MSG, and that it had an unusual ability to enhance or intensify the flavor of many high protein foods .

Glutamate is ubiquitous in nature. It is present in many foods and in the human body, either as one of the amino acid building blocks of protein and peptides, or in its free form . The glutamate bound into a protein structure does not have the flavor - enhancing properties of the free form . only the " L isomer " has this flavor - enhancing activity .

Commercialization of glutamate began in 1909 with its isolation from wheat gluten . Today about 40.000 ton of MSG are manufactured annually in about 15 countries through out the world [2] .

The major use of MSG in cooking arround the world is as a flavor enhancer in soup and broths, sauces and gravies and flavoring and spice blends. MSG is also included in a wide variety of canned and frozen meats, poultry, vegetable and combination dishes .

Results of taste panel studies indicate that a level of 0.05 - 0.8 % by weight in food gives the best enhancement of the food's natural flavor . In home or restaurant cooking, this amount to about 1-2 tea spoonfuls per kilogram of meat or per 8-12 servings of vegetables, cosseroles, soup, etc.

The use of MSG in foods, like that of hundreds of other flavors, spices and food additives, is subject to a variety of standards and regulations on a world wide basis In 1987, the joint expert committee on food additive (JECFA), Food and Agricultural Organization of the United Nations and the World Health Organization (FAO / WHO) reviewed and endorsed the safety of glutamate, allocating an acceptable daily intake (ADI) for MSG as " not specified " .

The previous numerical (ADI) has been removed, the implied exclusion of the use by humans under the age of 12 weeks has also been deleted . This is JECFA'S most favorable classification for food additives .

In the United States, MSG is included in the GRAS (Generally Recognized As Safe) list of food ingredients by the U . S . Food and Drug Administration, along with salt, pepper, sugar and vinger .

The scientific committee on food of the European commiunity evaluated MSG and gave number E 621 as a safe food additive.

In Japan MSG is a permitted food additive with no limitation . Studies on brain lesions in sensitive animal species, utilizing the injection or forced feeding of the huge dose of MSG in high concentrations, indicate that glutamate, like other food components, can induce toxic effects in test animals .

In studies done on mice using huge dose levels(500 mg / kg body weight) MSG was shown to produce brain lesion when the compound was injected or administered by forced intubation[3] .

It is important to note that large doses of MSG were required to induce brain damage . While World Health Organization authorities had recommended