

**EFFECT OF BENZOATE, NITRITE, ASPARTAME AND  
CARMOSINE COMPOUNDS ON EXPERIMENTAL  
ANIMALS**

by  
**MOHAMED SAYED AHMED SALAH HAKIL**  
*B.Sc. Agric. Sci. (Agric. Biochem.)*  
*Ain Shams Univ., 1991*

*A thesis submitted in partial fulfilment  
of  
the requirements for the degree of*

**MASTER OF SCIENCE**  
in  
*Agriculture*  
(*Agricultural Biochemistry*)

*Department of Biochemistry  
Faculty of Agriculture  
Ain Shams University*

(1996)





## APPROVAL SHEET

### ***EFFECT OF BENZOATE, NITRITE, ASPARTAME AND CARMOISINE COMPOUNDS ON EXPERIMENTAL ANIMALS***

by

***MOHAMED SAYED AHMED SALAH HAKIL***

***B.Sc. Agric. Sci. (Agric. Biochem.)***

***Ain Shams Univ., 1991***

This thesis for M.Sc. degree has been approved by :

**Prof. Dr.Y.G.ESKANDER** ..... *Y. Ghali*

Prof. of Biochemistry , Fac. of Agric., Cairo University.

**Prof. Dr.A.I.ABO SHADI** ..... *A.I. Shendi*

Prof. of Biochemistry and Vice-Dean, Fac. of Agric., Ain Shams  
University.

Prof. of Biochemistry, Fac. of Agric., Ain Shams University.

**Prof. Dr.S.A.EID** ..... *Salwa Eid*

Prof. & head of Biochemistry dept., Fac. of Agric., Ain Shams  
University.

Date of examination : 29 \ 6 \ 1996



***EFFECT OF BENZOATE, NITRITE, ASPARTAME  
AND CARMOISINE COMPOUNDS ON  
EXPERIMENTAL ANIMALS***

**BY  
MOHAMED SAYED AHMED SALAH HAKIL**

**B.Sc. of Agricultural Biochemistry  
Fac.Agric., Ain Shams Univ., 1991**

Under the supervision of :

**Prof. Dr. S. A. EID**

Prof. of Biochemistry

Fac. of Agric , Ain Shams University

**Prof. Dr. R. K. ATALLAH**

Prof. of Biochemistry

Fac. of Agric , Ain Shams University

**Prof. Dr. M. M. SHAMS EL-DIN**

Prof. of Biochemistry

Fac. of Agric , Ain Shams University



## **ABSTRACT**

### **MOHAMED SAYED AHMED SALAH HAKIL. EFFECT OF BENZOATE , NITRITE , ASPARTAME AND CARMOISINE COMPOUNDS ON EXPERIMENTAL ANIMALS**

Unpublished Master of Science, University of Ain Shams, Faculty of  
Agric., Department of Biochemistry, 1996

Different levels of benzoate, nitrite, aspartame and carmoisine which are used as food additives were evaluated for their effects on growth, liver function, kidney function, haematological analysis, serum constituents (glucose, total protein, globulin, total lipids and total cholesterol) and protein pattern of rats. The materials were placed in the drinking water daily for 60 days. The results revealed that ingestion of the above mentioned food additives retarded growth, increased sGPT (ALT) , sGOT (AST) , alkaline phosphatase activity, total bilirubin, urea, creatinine, uric acid total protein and globulin in serum and decreased total lipids, total cholesterol, haemoglobin, RBC and WBC. Also the results revealed that polyacrylamide gel electrophoresis technique (PAGE) showed appearance of some new bands in the serum protein of rats as a result of food additives (benzoate, nitrite and aspartame) treatment.

**Key words :** Benzoate, nitrite, aspartame, carmoisine, growth,  
liver function, kidney function, haematological analysis,  
serum constituents





## ACKNOWLEDGEMENT

The author wishes to express his sincere gratitude, deep appreciation and infinite thanks to **Prof. Dr. SALWA AHMED EID**, Professor of Biochemistry, Faculty of agriculture, Ain Shams Univ., for her supervision and help in presenting this Thesis and valuable advice during the course of this investigation.

The author is deeply grateful to **Prof. Dr. R. K. ATALLAH**, Professor of Biochemistry, Faculty of agriculture, Ain Shams Univ., for his help and kind co-operation during the course of this study.

Much gratitude is due to **Prof. Dr. M. M. SHAMS EL-DIN**, Professor of Biochemistry, Faculty of agriculture, Ain Shams Univ., for his continuous supervision and his sincere help during the steps of this work.



## CONTENTS

	Page No.
<b>INTRODUCTION.....</b>	1
<b>REVIEW OF LITERATURE.....</b>	2
I. Food preservatives materials.....	2
A. Benzoates.....	2
B. Nitrites.....	5
II. Sweeteners.....	10
ASpartame.....	10
III. Synthetic coloring agents.....	16
Carmoisine.....	16
<b>MATERIALS AND METHODS.....</b>	23
I. Materials.....	23
II. Animals.....	24
III. Design.....	25
IV. Biochemical analysis.....	25
A. Determination of chemical constituents of.....	25
1. Determination of serum glucose.....	25
2. Determination of serum total protein.....	26
3. Determination of serum globulin.....	26
4. Determination of serum GPT (ALT) and GOT (AST).....	27
5. Determination of serum alkaline phosphatase activity.....	27
6. Determination of serum total bilirubin.....	28
7. Determination of serum total cholesterol.....	28
8. Determination of serum total lipids.....	29
9. Determination of serum urea.....	29
10. Determination of serum creatinine.....	30
11. Determination of serum uric acid.....	30

	Page No.
B. Haematological analysis.....	31
1. Red blood cell count.....	31
2. White blood cell count.....	31
3. Determination of blood haemoglobin.....	31
C. Electrophoresis.....	32
D. Statistical analysis of data.....	32
<b>RESULTS AND DISCUSION.....</b>	<b>33</b>
I. Effect of benzoate and nitrite as preservatives.....	
materials.....	34
II. Effect of aspartame as sweetener material.....	62
III. Effect of carmoisine as coloring material.....	85
<b>SUMMARY AND CONCLUSION.....</b>	<b>110</b>
<b>REFERENCES.....</b>	<b>114</b>
<b>ARABIC SUMMARY.....</b>	<b>126</b>

## LIST OF TABLES

Table No.		Page No.
1-	Effect of different levels of benzoate and nitrite as food additives on body weight and serum glucose.....	35
2-	Effect of different levels of benzoate and nitrite as food additives on serum total protein & globulin.....	38
3-	Effect of different levels of benzoate and nitrite as food additives on total lipids and total cholesterol in serum.....	42
4-	Effect of different levels of benzoate and nitrite as food additives on transaminases GPT (ALT) and GOT (AST) in serum.....	45
5-	Effect of different levels of benzoate and nitrite as food additives on alkaline phosphatase activity and total bilirubin in serum.....	49
6-	Effect of different levels of benzoate and nitrite as food additives on urea, creatinine and uric acid in serum.....	53
7-	Effect of different levels of benzoate and nitrite as food additives on haemoglobin, RBC and WBC count in blood.....	58
8-	Effect of different levels of aspartame as food additive on body weight and serum glucose.....	63
9-	Effect of different levels of aspartame as food additive on serum total protein & globulin.....	66
10-	Effect of different levels of aspartame as food additive on total lipids and total cholesterol in serum.....	69
11-	Effect of different levels of aspartame as food additive on transaminases GPT (ALT) and GOT (AST) in serum.....	72

Table No.		Page No.
12-	Effect of different levels of aspartame as food additive on alkaline phosphatase activity and total bilirubin in serum.....	75
13-	Effect of different levels of aspartame as food additive on urea, creatinine and uric acid in serum.....	78
14-	Effect of different levels of aspartame as food additive on haemoglobin, RBC and WBC count in blood.....	81
15-	Effect of different levels of carmoisine as food additive on body weight and serum glucose.....	86
16-	Effect of different levels of carmoisine as food additive on serum total protein & globulin.....	89
17-	Effect of different levels of carmoisine as food additive on total lipids and total cholesterol in serum.....	93
18-	Effect of different levels of carmoisine as food additive on transaminases GPT (ALT) and GOT (AST) in serum.....	96
19-	Effect of different levels of carmoisine as food additive on alkaline phosphatase activity and total bilirubin in serum.....	99
20-	Effect of different levels of carmoisine as food additive on urea, creatinine and uric acid in serum.....	102
21-	Effect of different levels of carmoisine as food additive on haemoglobin, RBC and WBC count in blood.....	106