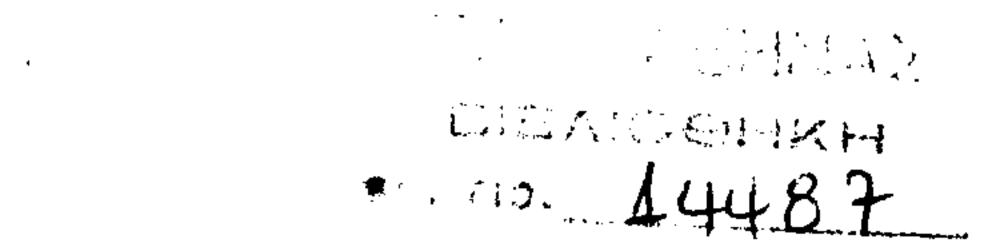
GGAL



## SORPTION PHENOMENA IN SOME HIGH SUGAR AND PROTEIN TRADITIONAL GREEK FOODS: THE CASE OF HALVA

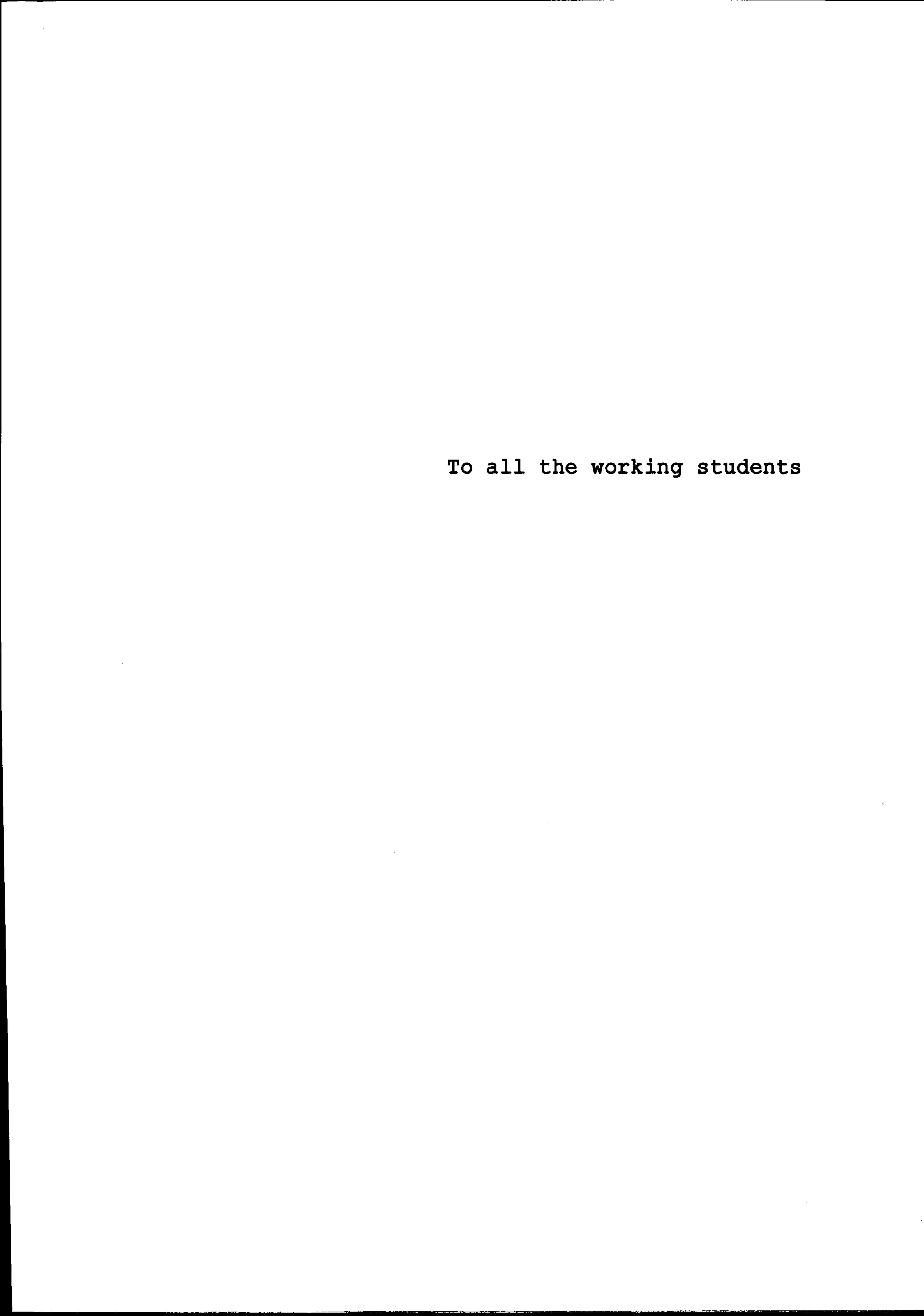
A thesis submitted in part fulfilment of the examination requirements for the award of

MASTER OF SCIENCE
IN
FOOD TECHNOLOGY

Submitted by: MARIA FOTOPOULOU

Supervised by: Dr EVANGELOS S. LAZOS

UNIVERSITY OF HUMBERSIDE 1994



## ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisor Dr E.S. Lazos for his invaluable help and guidance throughout this work.

I wish to thank "Athenian Brewery S.A." and especially Mr. C. Dimitriadis, Head of the Department of Technological Control, for allowing me to undertake this study.

I am indebted to Georgia Milonaki whose contribution to the data processing was invaluable.

I also wish to acknowledge the assistance and encouragement of Fotini Aggelopoulou during this study.

Finally, I would like to thank my family for its support and understanding.

## ABSTRACT

Sorption phenomena in plain and cocoa halva were studied using static method. Proximate analysis showed that halva contained on average 55% sugars, 25% fat and 14% protein. Its composition varies due to composition of tahini, a sesame seed paste used for halva manufacture. Moisture sorption isotherms (MSI) were obtained at 10, 25, 40 and 60°C. An hysteresis was observed at each temperature, while its magnitude was reduced with an increase in temperature. The upper limit of hysteresis loop was sifted with temperature increase, with the most dramatic dropping occuring at 60°C. Being a low moisture food, the BET model was applied to study MSI. Very low monolayer moisture values of 0.03 - 0.06 g H O/g dry matter were obtained while C constant values ranged from 0.128 to 0.529 in plain halva and from 0.060 to 0.299 in cocoa halva. The net isosteric heat of sorption was reduced as moisture content was increased. As temperature was increased sorbed moisture was increased due to dissolution effects. At 10,25 and 40°C crossing over in isotherms was observed.

## **CONTENTS**

The second secon

----

				page
	CHAPTER	1. I	NTRODUCTION	
	CHAPTER	2.	LITERATURE REVIEW	
		2.1.	Water activity and Sorption Isotherms	
			Definition	1
		2.2.	Sorption isotherms	3
		2.3.	Mathematical description of isotherms	8
		2.4.	Influence of Temperature on Moisture	
			Sorption Isotherms	10
		2.5.	Moisture Sorption Hysteresis	13
		2.6.	Methods of determination of Moisture	
			Sorption Isotherms	15
			2.6.1. Gravimetric	15
			2.6.2. Manometric	16
			2.6.3. Direct Hygrometer Methods	16
		2.7.	Effect of water activity on food pro-	
			perties	18
•		2.8.	Halva - Method of manufacture	22
	•	2.9.	Nutritional quality of Halva	24
	CHAPTER	3.	MATERIALS AND METHODS	
		3.1.	Sample source	27
		3.2.	Proximate analysis	27
		3.3.	Preparation of hygrostats	27
		3.4.	Preparation of weighing vials	28
		3.5.	Sample preparation	28

	3.6.	Determination of Moisture Sorption	page
		Isotherms	28
	3.7.	Handling of results	29
	3.8.	A measurement	29
CHAPTER	4.	RESULTS AND DISCUSSION	
	4.1.	Proximate Composition	30
	4.2.	Water activity	31
	4.3.	Sorption Isotherms	31
	4.4.	Application of BET Model	41
CHAPTER	5.	CONCLUSIONS AND FURTHER RESEARCH NEEDS	51
REFERENC	CES		53

•

•