# UNIVERSITI TEKNOLOGI MARA

# ACRYLAMIDE IN CHIPS AND CRISPS FROM LOCAL SME AND ITS POTENTIAL HEALTH RISK

ZAINORINA BINTI ZAINAL

Project paper submitted in partial fulfillment of the requirements

for the degree of

Bachelor in Environmental Health and Safety (Hons.)

Faculty of Health Sciences

JULY 2013

**Declaration by Student**

Project entitled "Acrylamide in Chips and Crisps from Local SME and Its Potential Health Risk" is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Tn. Hj. Hashim Bin Ahmad as Project Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

Student's Signature:

.....

(ZAINORINA BINTI ZAINAL)
2010235942
891108-05-5356

Date:.....

## ACKNOWLEDGEMENT

*In the name of Allah, The Most Gracious, The Most Merciful.*

Alhamdulillah, all praise to Allah, The Supreme Lord of the Universe. Piece and blessing to Nabi Muhammad S.A.W., all the prophets, their families and all the Muslims.

First of all, I would like to thank to God for His Mercifulness, to allow me to complete this project and soon completing my studies. I also would like to thank to my project supervisor, Tn. Hj. Hashim Bin Ahmad, Mr. Ahmad Razali Bin Ishak and all lecturers for the input, knowledge and guidance from the beginning towards the end of this study. I am sincerely indebted to them for taking great pains to keep me on the right track. Their support and assistance contributed to the success of the project hence fulfillment of the objectives of the project report.

Not to forget special thank to Mr. Azwat Bin Abdullah, Pn. Faseha (NADA), Mr. Fathi (NADA) and all lab assistant for their meaningful help in order to complete this project paper as well as all my classmates for the help and support.

Last but not least, it is incomplete if most of the important person is not mention, special appreciation I dedicated to my beloved mother, Pn. Hjh. Zaharah Binti Hj. Ma'asin and all the family members for always give me support mentally, physically, financial, emotional and also believe me. Without all of you, I would never reach the end today.

Thank you for all the love, supports and advices.

## TABLE OF CONTENT


| | | |
|---|---|---|
| **TITLE PAGE** | | |
| **ACKNOWLEDGEMENT** | | ii |
| **TABLE OF CONTENTS** | | iii |
| **LIST OF TABLES** | | vi |
| **LIST OF FIGURES** | | vii |
| **LIST OF APPENDICES** | | viii |
| **LIST OF ABBREVIATION** | | ix |
| **ABSTRACT** | | x |
| **CHAPTER ONE: INTRODUCTION** | | |
| **1.1** | Background Information | 1 |
| **1.2** | Problem Statement | 3 |
| **1.3** | Study Justification | 9 |
| **1.4** | Study Objectives | 10 |
| **1.5** | Study Hypothesis | 10 |
| **1.6** | Conceptual and Operational Definitions | 11 |
| **1.7** | Conceptual Framework | 12 |
| **CHAPTER TWO: LITERATURE REVIEW** | | |
| **2.1** | Properties of acrylamide | 13 |
| **2.2** | Use of acrylamide | 16 |
| **2.3** | Source of exposure | 16 |
| **2.4** | Toxicity of acrylamide | 17 |
| **2.5** | Formation of acrylamide in food | 18 |
| **2.6** | Factors affecting the formation of acrylamide in food | 23 |
| **2.7** | *Health effect of acrylamide* | *24* |

Abstract

ACRYLAMIDE IN CHIPS AND CRISPS FROM LOCAL SME AND ITS POTENTIAL HEALTH RISK

Zainorina Binti Zainal

**Introduction:** Acrylamide has been classified as group 2A, but there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals (andErkan Kalipci, 2009). The potential routes of exposure are ingestion, inhalation and dermal contact (cited in Manson et al. 2005). Acrylamide was forming in food as a result of heat-induced reaction between two naturally occurring ingredients which is amino acids asparagine and reducing sugars. To simplify, acrylamide is a result from the cooking or thermal processing of foods (Robin, 2007). **Objective:** To assess the level of acrylamide in the local chips and crisps from SMEs product and its potential health effects on humans. **Methodology:** The study design of this study is cross-sectional study which is to measure level of acrylamide in chips and crisps from local SME product. Thirty two samples (n=32), from four categories were obtained. The samples then were grind and extracted by using Soxhlet. All the samples were analyzed by using High Performance Liquid Chromatography (HPLC). Then, lifetime average daily intake was calculated and risk of dietary exposure to acrylamide was quantified. **Result:** Chips and crisps in potato category show the highest level of acrylamide while the lowest level of acrylamide was performed by flour category. From a Kruskal–WallisTest revealed a statistically no significant different in optimism levels across four different types of chips and crisps (potato: n=9, mean ± SD = 76.73 ± 107.94), (banana: n=7, mean ± SD = 44.53 ± 40.57), (flour: n=8, mean ± SD = 0.00 ± 0.00), (others: n=8, mean ± SD = 14.49 ± 30.35) and *p*-value is 0.079. If risk is more than 0.01, when consumed every day, chronic effect anticipated. **Conclusion:** Acrylamide was found high in potato chips due to Millard reaction involved. Acrylamide was present in potato and banana chips with a significant amount. Thus, risk to develop cancer was associated with dietary intake of acrylamide contaminated food. High temperature and long period of cooking are a part of critical control points for acrylamide formation. To ensure food safety among public, further HACCP analysis of acrylamide formation in food should be done.

*Keywords: Acrylamide, local chips and crisps, SME product, HPLC, Risk assessment.*