

**SYNTHESIS AND KINETIC MODEL STUDY OF OLEFINIC DOUBLE BONDS OF PALM
OLEIC FATTY ACIDS DERIVATIVES VIA EPOXIDATION**



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AUGUST 2020

3. Acknowledgements

IN THE NAME OF ALLAH THE MOST BENEFICENT AND MERCIFUL

First and foremost, I thank ALLAH the Almighty from the depth of my heart for His permission, guidance and blessing, I am able to complete this project successfully.

My deepest gratitude to Universiti Teknologi MARA Cawangan Terengganu, for awarding the Special Interest Group Grant Scheme (600-IRMI 5/3/DDN (11)(012/2019). Next, thank you to my member of SIG group Cik Norkamruzita Saadon for the valuable guidance, cooperation and encouragement. Without her, this project would have been impossible

Last but not least, , I would also like to thank and acknowledge, my wife Latifah Musa, my son Muhammad Sufyan As-Sauri, my parents (Md Zaini Zainal and Rashidah Jasin) and my family members for their support, encouragement, and sacrifices in completion of this project.

5. Report

5.1 Proposed Executive Summary

Epoxidised vegetable oils are often regarded as valuable oleochemical due to the wide range of industrial applications including cosmetics, personal care and pharmaceutical products. In this study, palm oleic acid which extracted from palm oil was epoxidised using in-situ performic acid with hydrogen peroxide as oxygen donor and formic acid as active oxygen carrier in the present of catalytic amount of inorganic acid. The knowledge of epoxidation palm oleic acid is indistinct; more investigations are required to study the epoxidation palm oleic acid. Palm oleic acid is classified as unsaturated fatty acid and the epoxidation process of palm oleic acid is quite different than other vegetable oils. Furthermore less research were carried out to study the reaction condition, optimization for improvement in yield, and selectivity of epoxidised palm oleic. Therefore, in this study, we aim to investigate the epoxidation process of palm oleic acid to maximize the selectivity of epoxidised oleic acid. In addition, the kinetic modelling strategy of epoxidation palm oleic acid will be developed to estimate kinetic constant for epoxidation reaction by using pseudo-homogenous model. This research finding provides additional insight into developing an efficient epoxidation procedure in order to produce high quality epoxidised oleic acid from palm oil.

5.2 Enhanced Executive Summary

The study was held to investigate the epoxidation process parameters of RBD (refined, bleached & deodorized) oleic acid palm oil- based via *in-situ* generated performic acid to percentage of relative conversion to oxirane (RCO). Performic acid was produced by mixing various concentration ratio of hydrogen peroxide as oxygen donor and formic acid as oxygen carrier. A Series of experiments were conducted at the optimum conditions to investigate the effects of reaction temperature, hydrogen peroxide to oleic acid mole ratio (H_2O_2/OA), and formic acid to oleic acid (FA/OA) unsaturation mole ratio on the percentage of relative conversion to oxirane (RCO). The results showed the optimum value RCO was obtain by using 1:1 molar ratio of FA/OA, 1:1 mole ratio of H_2O_2/OA and temperature of 45°C. Investigation on reaction time showed that the highest RCO was attained at 2 hours. This finding hope to provide an additional insight in understanding the epoxidation process from RBC palm oil oleic acid.

Keywords: Epoxidation, palm oleic acid, optimization, in-situ performic acid, epoxy

Contents

- 1. Letter of Report Submission iii
- 2. Letter of Offer (Research Grant)..... iv
- 3. Acknowledgements v
- 4. Enhanced Research Title and Objectives vi
- 5. Report 1
 - 5.1 Proposed Executive Summary 1
 - 5.2 Enhanced Executive Summary..... 2
 - 5.3 Introduction 3
 - 5.4 Brief Literature Review 5
 - 5.5 Methodology..... 7
 - 5.6 Results and Discussion 9
 - 5.7 Conclusion and Recommendation..... 12
 - 5.8 References/Bibliography 13
- 6. Research Outcomes..... 15
- 7. Appendix 16