

**ELECTRICAL PROPERTIES OF COMPOSITE VEGETABLE OILS FOR
INSULATION**

This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons.) Electrical
**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA**



MOHD AFIQ BIN AZHAR

2010384077

**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA MALAYSIA
40450 SHAH ALAM, SELANGOR DARUL
EHSAN
MALAYSIA**

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful.

Alhamdulillah, first and foremost, I would like to thank our Creator for giving me a still functioning body and mind in order to live, life and learn, and particularly to work on my Final Year Project (FYP)

Deepest thanks and appreciation to my supervisor Pn Aida binti Kusim, Hj. Ir. Harizan Bin Mat Haris and technician Encik Salehudin bin Redzuan that have been contributed by supporting my work and help during the FYP progress till it is fully completed. Besides, I would like to thank the authority of UiTM for providing me a good environment and facilities to complete this FYP. Also to those who indirectly contributed in this FYP, your kindness means a lot to me.

I must give my high, respectful and gratitude to my parents, family and others for their cooperation, encouragement, constructive suggestion and full of support for the (FYP) completion, from the beginning till the end. This gives I chance to explore a new knowledge as well as for giving me advices in order to improve myself to become a better person. This (FYP) make I realized the important of knowledge in Electrical Engineering to produce quality Engineers.

ABSTRACT

This paper present the research on electrical properties of composite vegetable oils for insulation. The vegetable oils that are use are palm oil and corn oil. Test were carry out by applying high voltages ranging between 5 kV to 30 kV at room temperature 20 °C – 30 °C. AC breakdown test was used to analyze the breakdown voltage for the insulator whenever Dissipation Factor test was to determine the quality of the insulation. Beside, this paper investigate the resistivity and tan loss of the palm oil and corn oil whether those of vegetale oil are suitable to be insulation for transformer insulation oil or not. Beside that, this paper also make comparison for the characteristic of the palm oil and corn oil. The carактерistic that are to be compare are breakdown voltage and tangent loss. To make comparison for this insulation oil, both of oil are mixed in a test vessel in different quantity or ratio in order to see the changes of the characterictics of this vegetable oils. Other than that, the vegetable oil is good for cooking to health also has been determined in this study.

TABLE OF CONTENT

ACKNOWLEDGEMENT	i
ABSTRACT	ii
TABLE OF CONTENT	iii
LIST OF FIGURE	v
LIST OF TABLE	vii
LIST OF ABBREVIATION	viii
CHAPTER 1: INTRODUCTION	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT	2
1.3 OBJECTIVE.....	3
1.4 SCOPE OF WORK	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 DISIPATION FACTOR.....	4
2.2 SHERING BRIDGE.....	6
2.3 AC BREAKDOWN TEST.....	7
2.4 UNSATURATED AND SATURATED FATTY ACID	8
CHAPTER 3: METHODOLOGY	10
3.1 FLOW CHART OF THE PROJECT	10
3.2 PARAMETER OF INSULATION SAMPLES	12
3.3 SAMPLE PREPARATION.....	13
3.4 TYPE OF ELECTRODE	15
3.4.1 ELECTRODE IMPLEMENTATION.....	15
3.5 EXPERIMENTAL TECHNIQUES	16
3.5.1 TEST PROCEDURE	16
CHAPTER 4: RESULT AND DISCUSSION	26
4.1 RESULT FROM MEASURING AND AUTOMATIZATION CONTROL	26
4.2 DISSIPATION FACTOR TEST	41
4.3 AC BREAKDOWN VOLTAGE TEST	43

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In electrical, transformers is very important equipment, this is because if the transformer does not exist in electrical system it will cause a sorts of problems, for example we cannot send the electricity generated by power generators. In transformers, oil is used as an insulator and also as a coolant. Electrical devices such as transformers will produce heat when they perform the process. Heat release during transformer operation is very high, and it also can cause the insulation on the transformer will be damaged and at the same time it will cause the transformer itself damaged. Damage that are happen to the transformer causing a lot of losses in order to replace a new one or it will take a long time to repairing it. It is also may cause a leak of toxic fluid. Cooling ability in the transformer insulation will determine the appropriate amount of power to be handle by transformer, therefore transformers specially designed to maximize heat release, then this will make designing transformers will be costly. While transformers in operation it will produce heat through the winding and the heat will be transferred to the insulating oil in transformers. The hot oil then will move to the radiator through the process of convection. The convection process will make the winding are easy to be cool back. There are many properties that are need to focus before the insulation oil to be use in transformers for instance, dielectric strength, viscosity and many more[1