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SEE 4722

**FAKULTI KEJURUTERAAN ELEKTRIK
UNIVERSITI TEKNOLOGI MALAYSIA
KAMPUS SKUDAI
JOHOR**

MAKMAL

**INSTITUT VOLTAN DAN ARUS TINGGI
PROBLEM (Experiment 12)**

**Characteristics of Natural Palm Oil as High Voltage Insulating
Material**

Disediakan oleh :	Disahkan oleh : Ketua Jabatan
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Introduction

Transformer oil or insulating oil is usually a highly-refined mineral oil that is stable at high temperature and has excellent electrical insulating properties. The oil helps cool the transformer. Because it provides part of the electrical insulation between internal live parts, transformer oil must remain stable at high temperatures for an extended period.

Since long time ago, petroleum-based mineral oils have been used as liquid insulating materials. This is because the insulating oils have excellent dielectric properties such as high electric field strength, low dielectric losses and good long term performance. However, due to the environmental consideration; the oils are considered to be replaced with more environmental friendly liquid insulating materials such as vegetables oil, palm oil, and others. Many researchers are now searching new types of insulating materials, which are generally organic types and obtained from the nature.

Problem Statement:

Petroleum based mineral oils have been used for liquid insulation in high voltage equipment since long time ago because they have excellent dielectric properties such as high electric field strength, low dielectric losses and good long term performance. However, the oils are non biodegradable. Therefore, they can cause serious problems to our environment. Besides, they are going run out in the future since they are extracted from petroleum, which are non-renewable. According to these problems, this project will be focusing to find the new liquid insulating materials which are friendly to the environment and have good insulation properties compared to the mineral oil. Students are required to investigate the performance of natural palm oil as compared to mineral oil based on the dielectric strength, dissipation factor ($\tan\delta$) or power factor, capacitance and insulation resistance.

Trigger

The performance of the insulating oil can be obtained by measuring several dielectric properties and electrical parameters values such as;

- ❖ Dielectric strength
- ❖ Dissipation factor ($\tan\delta$) or power factor
- ❖ Capacitance and insulation resistance

Questions

- 1) What are some characteristics of palm oil which can be considered as the new insulating oil replacing the transformer oil?
- 2) What is the definition of such dielectric strength and how do you relate with the performance of the insulating oil?
- 3) How do you measure the dissipation factor ($\tan\delta$) or power factor and related to the insulating oil characteristic?
- 4) Based on your investigation, what are some problems which can be encountered in the transformer oil during its operation?