

Suitability of Alternative Insulating Fluid for Power Transformer: A Laboratory Investigation

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Abstract : Power transformer is a vital element in a power system as it continuously regulates power flow, maintaining good voltage regulation. The working of transformer much depends on the oil insulation, the oil insulation also decides the aging of transformer and hence its reliability. The mineral oil based liquid insulation is globally accepted for power transformer insulation; however it is potentially hazardous due to its non-biodegradability. In this work efficient alternative biodegradable insulating fluid is presented as a replacement to conventional mineral oil. Dielectric tests are performed as distinct alternating fluid to evaluate the suitability for transformer insulation. The selection of the distinct natural esters for an insulation system is carried out by the laboratory investigation of Breakdown voltage, Oxidation stability, Dissipation factor, Permittivity, Viscosity, Flash and Fire point. It is proposed to study and characterize the properties of natural esters to be used in power transformer. Therefore for the investigation of the dielectric behavior rice bran oil, sesame oil, and sunflower oil are considered for the study. The investigated results have been compared with the mineral oil to validate the dielectric behavior of natural esters.

Keywords : alternative insulating fluid, dielectric properties, natural esters, power transformers

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