

Comparative Study on Power Transformers Vegetable and Mineral Oil Ageing

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Abstract— Due to the increasing need to replace the petroleum based products, there's an interest in replacing the mineral insulating oil for electrical equipment with biodegradable vegetable oil. This paper presents a comparative experimental study concerning the ageing of mineral and vegetable oils used in power transformers. In this view, samples of mineral and vegetable oil were accelerated thermally aged, and their dielectric properties (real part of the complex relative permittivity, loss factor and resistivity) were determined at different ageing times. The evolution of the degradation process in time was studied by determining the dielectric properties variation rate. The results show that the values of the relative permittivity and loss factor determined for new oil are higher in the case of vegetable oil than for the mineral oil, and vegetable oil's resistivity is lower than that of mineral oil. It has been determined that during the ageing process the color of the mineral oil samples visibly changes with the ageing time, while in the case of vegetable oil samples, these changes are not significant. Also, the variation rate of vegetable oil's real part of relative permittivity, loss factor and resistivity is decreasing in time, while that of mineral oil has an increasing tendency.