

## Effects of HQ on Fractal Dimension of Electrical Tree in DGEBA/MDA/SN System

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Epoxy resins have good combination of thermal, mechanical and electrical properties and have been used widely in the electric and electronic industry. But the conventional epoxy resin system DGEBA/MDA was too brittle to be used for conductor-supporting insulator. To improve the impact resistance, a new reactive additive, SN(succinonitrile) as a chain extender was introduced and the system showed high impact resistance value. From this start point, we introduced cure accelerator HQ(hydroquinone) to reduce the cure reaction time and investigated the feasibility of DGEBA/MDA/SN/HQ system for electrical insulator from the view point of fractals which has self-similarity. Long-term dielectric breakdown phenomena by electrical treeing deterioration in the thick polymeric insulator under strongly inhomogeneous high electric fields are the main causes of electrical failure. To simulate this phenomena, needle electrode(tip angle: 30°, tip radius: 3 μm) was embedded and AC high voltage was applied until dielectric breakdown in insulating silicone oil. The electrical treeing phenomena was observed under the microscopic observation and fractal dimension or the degree of treeing deterioration was numerically measured by using scale covering method at various test conditions. All the trees grown in DGEBA/MDA/SN/HQ system were fractals from the straight line between log(number of grids covering trees) and log(grid scale). The dielectric breakdown strength increased to that of DGEBA/MDA system depending on post curing conditions.

### Abstracts

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