

RINGKASAN

Polimer saat ini telah banyak diteliti orang dengan harapan bisa didapatkannya formula bahan isolasi dengan kinerja yang tinggi pada penggunaan tertentu. Polimer mampu memegang peranan penting sebagai bahan isolasi karena memiliki kelebihan baik secara fisis maupun kimiawi. Isolator polimer semakin meluas penggunaannya baik di level tegangan transmisi maupun distribusi dan memiliki pangsa pasar cukup lebar di pasaran dunia. Polimer, khususnya resin epoksi memiliki beberapa kelemahan. Bahan ini sensitif jika digunakan pada suhu tinggi, kelembaban tinggi, dan daerah dengan intensitas radiasi ultraviolet (UV) tinggi, seperti di Indonesia. Di kawasan industri semen Gresik disinyalir banyak terjadi kegagalan isolator karena permukaannya terkontaminasi oleh lapisan polutan yang bergaram dan lembab.

Penelitian ini merupakan penelitian laboratorium untuk mengetahui kinerja elektrik dan mekanis dari bahan isolasi resin epoksi yang terkontaminasi polutan industri di daerah tropis. Bahan uji resin epoksi terbuat dari *diglycidyl ether of bisphenol A* (DGEBA) sebagai bahan dasar, *methaphenylene diamine* (MPDA) sebagai bahan pengeras dan diberi bahan pengisi *rice husk ash* (RHA). Ukuran dari bahan uji adalah 70 mm x 70 mm x 5 mm. Perbandingan campuran DGEBA dengan MPDA adalah 1 : 1, sedangkan bahan pengisi (*filler*) divariasi mulai dari 10 %, 20 %, 30 %, 40 % dan 50 % dari berat total bahan uji.

Penelitian yang dilakukan untuk mengetahui seberapa besar pengaruh komposisi bahan pengisi (*filler*) yang mengalami penuaan dipercepat terhadap kinerja bahan isolasi resin epoksi yang terdiri dari: kekuatan mekanis, tegangan *flashover*, arus bocor, sudut kontak hidrofobik, perubahan permukaan dan perubahan struktur kimia.

Hasil penelitian menunjukkan bahwa kekuatan tarik setelah penuaan cenderung lebih besar dibanding sebelum penuaan tetapi kekerasan permukaan setelah penuaan cenderung lebih kecil dibanding sebelum penuaan. Komposisi *filler* tidak signifikan dalam mempengaruhi kinerja tegangan *flashover* dan arus bocor sedangkan lama penyinaran UV cukup signifikan dalam mempengaruhi kinerja tegangan *flashover* dan arus bocor. Semakin lama bahan uji tersebut mengalami penyinaran UV, maka tegangan *flashover* cenderung turun, yang diikuti dengan kenaikan arus bocornya. Bertambahnya komposisi *filler* akan menurunkan sudut kontak permukaan bahan uji, yang dapat mempengaruhi peningkatan kandungan ESDD. Penyinaran UV selama 96 jam pada bahan uji menunjukkan adanya gejala degradasi permukaan yang belum berpengaruh secara signifikan terhadap perubahan struktur kimia permukaan

Kata Kunci : *ESDD, arus bocor, tegangan flashover, hidrofobik, Silicone rubber, Rice Husk Ash*

SUMMARY

Polymers have been investigated by many researchers in order to find high performance insulator formula for specific uses. Polymers can play a significant role as insulating media because of their excellent physical and chemical properties. Polymeric insulators are increasingly being used in both distribution and transmission voltage ranges and steadily capture a wider share of the world market. On the other hand, polymers, such as epoxy resin have some disadvantages. It is very sensitive if it is used in high temperature, very humid, or area with high intensity of ultraviolet (UV) radiation, like in Indonesia. In Gresik cement industry, there were many insulators failed because the surfaces were contaminated by salty pollution layer and they were wet.

This research was a laboratory study to investigate electrical and mechanical performance of insulation material made from epoxy resin contaminated with artificial industrial pollution. Test material of epoxy resin was made from diglycidyl ether of bisphenol A (DGEBA) as base material, methaphenylene diamine (MPDA) as curing agent, silicone rubber and rice husk ash (RHA) as filler. The dimension of test material was 70 mm x 70mm x 5 mm. Ratio of DGEBA to MPDA was 1:1, while filler was varied from 10%, 20%, 30%, 40% and 50% of total weight of test material.

This research was to identify the influences of filler that influenced in accelerated ageing on performance of epoxy resin isolation material consisting of mechanical strength, flashover, leakage current, contact angle of hydrophobic equivalent salt deposit density (ESDD), degradation effect and chemical structural change.

The results of the research indicated that mechanical tensile strength of test material after accelerated ageing was better than before accelerated ageing for all filler compositions but hard value of test material before accelerated ageing was better than after accelerated ageing for all filler compositions. The performance of flashover and leakage current were not influenced by the composition of filler. The performance of flashover and leakage current were influenced duration of UV radiation. More longer period of UV radiation resulted in flashover decrease, but, the increase in the leakage current. It is seemed that it was caused by the decrease in hydrophobic of characteristic of test material that influenced ESDD content. As a result accelerated aging as long as 96 hours have not significant effect to the deterioration of epoxy resin insulating materials.

Keywords : *ESDD, leakage current, flashover, hydrophobic, silicone rubber, rice husk ash (RHA)*