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The effect of DBDS, DBPC, BTA and DBP combinations on the corrosion of copper immersed in mineral transformer oil



Nemer Muhanna

King Fahd University of Petroleum and Minerals, Saudi Arabia

The effect of adding various combinations of dibenzyl disulfide (DBDS), 2,6-di-tert-butyl-p-cresol (DBPC), 2,6-di-tert-butyl-phenol (DBP) and 1,2,3-benzotriazole (BTA) to a mineral transformer oil on the corrosion of copper strips coated with kraft paper dipped in that oil and aged under accelerated oxidation conditions is assessed qualitatively by visual inspection of the copper strips (IEC 62535 standard method) and quantitatively by determination of the additives left after the ageing period. Qualitative examination shows that BTA protects against copper corrosion but once depleted from the oil matrix and presumably stripped from the copper surface DBDS attacks the copper and causes it to corrode. For continued protection against corrosion, BTA needs to be regularly replenished since qualitative examination also shows that if BTA is excluded from the added chemicals no significant corrosion suppression takes place. The quantitative method showed slight depletion of DBPC and DBP in the presence of DBDS, meanwhile DBDS showed drastic depletion after 120 hours of ageing. These observations point to a minimal role for DBPC and DBP antioxidants as corrosion suppressors when DBDS is present in the mineral oil. When either of the DBPC or DBP antioxidants was added to oil samples already containing DBDS and BTA, their depletion was very limited over 120 hours of ageing and a minimal corrosion was observed on the copper strips, indicating that either DBPC or DBP assists BTA in mitigating copper corrosion by DBDS.

Biography

Nemer Muhanna has completed his PhD from King Fahd University of Petroleum and Minerals. Since 2014, he is working as Analytical Sciences and Technology Scientist at Sadara Chemical Company, one of the largest petrochemical plants in the world. He has experience in the Analytical Field of about 20 years. He has published more than 15 papers in reputed journals in different fields.

m_nemer@hotmail.com

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