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Karabagh/Azerbaijan

PROCEEDING BOOK VOLUME-I

Editor
Academic Irade Huseynova

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Institute of Molecular Biology and Biotechnology of the Azerbaijan National Academy of Sciences
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COATING AND FLAMMABILITY PROPERTIES OF MODIFIED EPOXY-BASED HYBRID COMPOSITES

Nimet OZMERAL[1], Suheyla KOCAMAN[1], Ulku SOYDAL[2,3], Gulnare AHMETLI[1]

[1]Dept. of Chemical Engineering, Faculty of Engineering and Natural Sciences,

Konya Technical University, 42022, Campus, Konya, Turkey

[2]Karapınar Aydoğanlar Vocational School, Selcuk University, Konya, Turkey

[3]Dept. of Biochemistry, Faculty of Science, Selcuk University, Campus, Konya, Turkey

N. Ozmeral:; Orcid 0000-0003-3463-8697

S. Kocaman:; Orcid 0000-0001-5199-8577

U. Soydal:; Orcid 0000-0001-8894-3940

G. Ahmetli:; Orcid 0000-0002-9381-4139

ABSTRACT

In this study, phenolic novolac-type epoxy resin (EPN) modified with 4 wt% polystyrene (PS) waste, was used as the polymer matrix (EPN-PS) for the first time. Hybrid composites were prepared using red mud waste (RMW) waste at 15-35 wt% and montmorillonite-type nanoclay (NC) at a 2 wt% constant ratio. RMW was a waste material produced during the production of bauxite alumina with the Bayer process. The modification of NC has been made with tetramethylammonium chloride (TMAC). The NC and RMW particle sizes were determined by Particle Size Distribution Analysis. The average sizes were determined as 1631 d.nm and 1064 d.nm, for NC and modified NC (MNC), respectively. Chemical structures of nanoclays were elucidated by FTIR. The effect of the type and ratio of fillers on the coating and flammability properties of the composites were examined. The corrosion protection properties of the composite coatings were determined by immersion test in 5 wt% NaOH, HCl, and NaCl solutions. Surface morphologies of hybrid composites were examined by scanning electron microscopy (SEM) before and after corrosion tests. In addition, the changes in composite coatings in corrosive environments were also examined with a microscope. The modification of NC and the application of hybrid reinforcement were more effective in corrosion resistance of composite coatings in basic and salty environments. The maximum enhancement of corrosion resistance was achieved at 2 wt% MNC-35 wt% RMW. Combustion of the EPN-PS matrix (115 sec) decreased with adding NC/MNC and RMW, and these composites were extinguished in 69 sec and 47 sec, respectively.

Keywords: composite, nanoclay, hybrid, corrosion, flammability