

Nanocomposites and nanomaterials

Formation of protective nano-layers on metals formed by extract of oilcake rape seeds and alkoxysilanes from gas-vapor phase

V.I.Vorobyova¹, E.E.Chygyrynets¹, M.I.Vorobyova²

¹ *Department of Physical Chemistry, National Technical University of Ukraine "Kiev Polytechnic Institute". Ave Peremogy, 37, Kiev-03056, Ukraine.
E-mail: viktorkathebest@yandex.ru*

² *Department of Inorganic Materials Technology and Ecology, Ukrainian State University of Chemical Technology. Gagarin Avenue, 8, Dnepropetrovsk-49000, Ukraine.*

Temporary corrosion protection is designed to prevent the corrosion of metal surfaces of equipment during transport and storage. There are many types of temporary protection methods. Among them, the use of volatile corrosion inhibitors (VCIs) is an effective and convenient means. Most of the volatile corrosion inhibitors are synthetic chemicals, expensive, and very hazardous to environments. Thus, alternative of environmental-friendly VPIs is under consideration. The extract of oilcake rape seeds (*Brassicaceae*), which contains many chemicals compounds, may be used as VCIs [1–3]. The authors found that the isopropanol extract of rapeseed meal provides an effective level of corrosion protection at the level of 90%. It was known that synergistic inhibition effect (synergism) is a combined action of compounds greater in total effect than the sum of the individual effects. The synergistic inhibition effects of the oilcake rape seeds and alkoxysilanes on the corrosion of mild steel was studied by weight loss, potentiodynamic polarization curves, SEM observations, FT-IR methods. In the presence of water, the hydrolyzable alkoxy group tends to form a reactive silanol group (SiOH), which reacts with a hydroxyl group on the metal surface to form siloxane (Si–O–Si) and metalsiloxane (Me–O–Si) covalent bonds. The hydrolysis reaction proceeds spontaneously, without catalysts, but acids which are adsorbed on the steel surface from the vapor phase a plant extract accelerate the hydrolysis of silanes.

1. Chygyrynets' O.E., Vorobyova V.I. A study of rapeseed cake extract as eco-friendly vapor phase corrosion inhibitor // Chemistry and Chemical Technology.-2014. - 8, -№. 2.-P. 23 -242.
2. Vorobyova V., Chygyrynets' O. Evaluation of various plant extracts as vapor phase corrosion inhibitor for mild steel // British Journal of Science, Education and Culture. -2014.-№. 2(6).-P. 43-49.