# Inhibition of atmospheric corrosion of iron and aluminum by surface organosilicon layers

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Organic silanes are able to adsorb on metal oxide surface with formation thin siloxane layers. These layers can be used to protect metal from corrosion. The objectivities of the work is a study of the mechanism of silanes adsorption on aluminum and iron surfaces from a vapor phase, and possibilities of inhibition of corrosion processes at the metal-gas interface. The study of alkoxysilanes RnSi (OC2H5)4-n on aluminum from vacuum and on iron from argon flow have been carried out. It has been studied adsorption of silanes from a vapor phase on fresh aluminum and iron surfaces.

The effect of preadsorbed water on the silane adsorption aluminum and iron surface was carried out. It was shown that silanes during adsorption displace adsorbed water to the vapor phase. The experiments carried out in vacuum show, that a necessary condition of the formation of the covalent bonding of silane molecules with metal atoms of the surface is the presence of adsorbed water on the surface. The mechanism of silane chemisorption includes hydrolysis to form silanol and the condensation with hydroxyl groups of the surface. The effect of the water in the argon flow on the kinetics and thickness of siloxane films is investigated. We have studied the possibilities of inhibition of metals corrosion by thin siloxane films. The study of water adsorption on sylilated aluminum surface have shown that the presence of 1 monolayer of silane leads to decrease of water adsorption by a factor of 3 as compared to unmodified aluminum. Corrosion tests of the modified samples were carried out to study the behavior of in water. The obtained data indicate that silane chemisorbed monolayer can decrease by 1.5-2 times the interaction rate of the metal with water. The strongest effect was observed in triethoxysilanes, which can form surface linear siloxane chains or bond the neighboring atoms of the surface.

The anticorrosion properties of silane adsorbed layers on aluminum and iron surfaces was studied by method of accelerated test in climatic and salt fog chambers/ Corrosion of metals have been evaluated by resisthometric technique, quartz microbalance and routine corrosion methods. It has been shown that surface siloxane layers considerable inhibit atmospheric corrosion of aluminum and iron. Factors which can determinate he effectiveness of organosilicon layers was studied. It have been studied the effect of thickness of organosilicon layers on inhibiting effect of the layer. It was shown that solvent nature can effect on silane anticorrosion action in dependence on chemical structure of silane. Influence chemical structure of intial silanes, structure of layers, and conditions of silane deposition were studied. The mechanism of organosilcon layers participation in physical chemical properties on aluminum and iron surfaces during atmospheric corrosion is proposed.