THE CORROSION RESISTANCE OF COATINGS SYNTHESIZED FROM
CONDENSATION OF METHYLENE DIISOCYANATE AND OLEILAMINE

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Recently, polyurea has been investigated as anticorrosive coating system. The pronounced advantages are fast curing rate, hardness, flexibility, tensile strength and high resistance against chemicals and water. These properties have extended their potential application areas. Furthermore, their ability to form excellent films on metal surface is said to be superiority to conventional polyurethane coatings. The main drawback of polyurethane is known to be –OH groups of polyol, then the coating becomes more sensitive to humidity [1]. Moreover, there are studies aiming to improve these coatings with preparing their composites with polyurea and conducting polymers (like polypyrrole) have been reported recently. Polyurea synthesis is very similar to polyurethane and its chemical structure is thought to be more useful for anticorrosive application [2].

In this study, diurea was synthesized with condensation reaction of oleilamine with ethylene diisocyanate. Also, some additives like colouring pigment and calcite were used for obtaining optimum film quality. Besides, polyurea-polypyrrole composite coating was prepared on steel. Polypyrrole was considered to enhance the protection efficiency, in the manner of anodic protection [3]. In order to investigate corrosion performance of these coating, electrochemical testing was carried out in diluted Harrison solution (%0.35 (NH₄)₂SO₄ + %0.05 NaCl), which represents the corrosive environment caused by acid rain. Electrochemical impedance spectroscopy (EIS) and anodic polarization plots were used to evaluate corrosion performance. The EIS measurements were recorded at instantaneously measured open circuit potentials, after various exposure times extending to 14 days. The frequency range was from 10⁴ to 10⁻² Hz and the amplitude was 7 mV/s. The anodic plots were recorded after 1h of immersion time in corrosive solution. The scan rate was 2 mV/s and the measured Ecorr value was the initial potential value of scan. The results showed that these coatings have shown good barrier property against corrosion of mild steel.

Figure 1. The appearance of coated samples and EIS results in diluted Harrison solution.

References