

## Comparison of the Corrosion Resistance of Several Conversion Treatments for Galvanized Steel in NaCl Solution

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Chromate conversion treatments have been widely used due to their excellent corrosion resistance properties, however their use is increasingly restricted because of the highly toxic chromic acid solutions required, with consequent effluent disposal and ecological problems. The elimination of these toxic chemicals is considered a priority within European Union.

In this work, the corrosion resistance of various alternative pretreatments to yellow chromating has been investigated. The pretreatments evaluated were: (i) silica colloidal with particles of fluorzirconium and  $\text{Cr}^{3+}$  layer, (ii)  $\text{Ce}^{3+}$  layer, (iii)  $\text{Ce}^{4+}/\text{Ce}^{3+}$  double layer, and (iv)  $\text{Cr}^{6+}$  chromating (as reference). These were applied on electrogalvanized steel and exposed to 0.05 M NaCl solution was investigated by using electrochemical techniques (polarization curves and impedance measurements). So far, the experimental results at short exposure times have shown that, when compared with the hexavalent chromate protective properties, the silica colloidal with particles of fluorzirconium and  $\text{Cr}^{3+}$  layer offered similar performance. Even though the  $\text{Ce}^{3+}$  layer and  $\text{Ce}^{4+}/\text{Ce}^{3+}$  double layer presented fairly good corrosion resistance for short immersion periods, their protective properties rapidly deteriorated with time.

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