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Electrochemical Impedance Spectroscopy and potentiostatic measurements for investigation of corrosion inhibition of Aluminium surfaces

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Electrochemical impedance spectroscopy (EIS) and potentiostatic measurements are valuable tools for quantitative determination of corrosion of metallic surfaces. Although aluminium shows corrosion resistance under normal environmental conditions, it undergoes pitting corrosion in chloride-rich environments. Corrosion inhibitors are therefore necessary to maintain long term stability of aluminium surfaces.

Polarization resistance (R_p) obtained from Nyquist plots increases and the open circuit potential (V_{oc}) shifts towards negative potentials when extracts of matured leaves of *Neolitsea cassia* (wild cinnamon) are introduced to aluminium specimens exposed to chloride environments. These measurements, together with smaller mass losses of aluminium specimens when it is in contact with the extract, conclusively demonstrate that the wild cinnamon extract has the ability to control corrosion. It is also determined that the ethanol extract is more effective towards corrosion resistance as compared to the aqueous extract.

The inhibition efficiency of corrosion of aluminum, determined by comparing R_p values in the absence and the presence of the extract, while maintaining the same chloride concentration, increases with the increase in concentration of the extract and the period of immersion. However, prolonged exposure of specimens to the extract decreases corrosion efficiency, probability due to the decomposition of substances responsible for corrosion inhibition.

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