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CORROSION INHIBITION OF MILD STEEL BY *Piper betle* (BETEL) IN H_2SO_4 ACID

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Corrosion of mild steel has become a major problem in many industrial processes as it often gets in contact with acids during various production steps, such as cleaning the metal surface to remove undesirable scale and rust. During the pickling of scaled mild steel, the thinner and more soluble scale is removed. Consequently, some exposed base metal is attacked before the pickling operation is complete. Inhibitors are usually used in order to minimize the damage caused during this operation. Nevertheless, the environmental toxicity of organic corrosion inhibitorshas encouraged the search for green inhibitors as they are biodegradable, and do not contain heavy metals or other toxic compounds. In addition to being environmentally friendly and ecologically acceptable, plant products are inexpensive, readily available and renewable, providing an alternative approach of corrosion inhibition.

Piper betle (Betel) is a common plant cultivated in Sri Lanka. Essential oils found in the common Sri Lankan betel leaves consist of safrole (48.7%) as the major constituent, followed by chavibitol acetate (12.5%) and allylpyrocatecholdiacetate (11.3%). Although properties, such as antimicrobial, insecticidal, antioxidant, antinociceptive, antidiabetic and gastro-protective activities have been investigated, the corrosion inhibition effect of betel leaves has not been reported

This research investigates the ability of the betel leaf extracts as a corrosion inhibitor for mild steel.

Mass loss measurements of mild steel coupons placed in H_2SO_4 of concentrations varying from 0.05 mol dm^{-3} to 1.00 mol dm^{-3}indicate that, increase in the strength of the acid enhances the extent of corrosion of mild steel, which reaches an equilibrium within 48 hours. This can be strongly inhibited by the introduction of the betel leaf extract at 8% strength for all acid concentrations attempted, and further the system takes a longer time period to reach equilibrium in the presence of the extract. Electrochemical impedence spectroscopic studies conducted in the frequency range of 10kHz to 10mHz in 0.50mol dm^{-3} H_2SO_4 provide polarization resistance (R_p) values enhanced from 1000 Ohms with 2% extract to 8000 Ohms with 20% extract.

These findings demonstrate the strong corrosion inhibition ability of extracts from the betel leaf.