

## Inhibiting effect of some synthesized surfactants from petroleum oils on the corrosion of aluminium in hydrochloric acid solution

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**Abstract** Anionic surfactants [namely, gasoil sulfonate (GOS), kerosene sulfonate (KES), heavy solvent sulfonate (HSS) and total gasoline sulfonate (TGS)] were obtained from Algerian petroleum fractions. Their inhibiting effect on aluminium corrosion in hydrochloric solution (1 M HCl) is studied, using weight loss measurements, electrochemical polarization, and electrochemical impedance spectroscopy methods. The results obtained from different techniques are in good agreement and show that surfactants act predominately as cathodic inhibitors. The inhibition efficiency increases with increasing inhibitor concentration and decreases in the order: GOS > KES > HSS > TGS. The adsorption process of GOS was also studied in the temperature range of 293–323 K and reveals that the inhibitor adsorption onto Al is a physisorption-type, spontaneous and exothermic.

**Keywords** Corrosion inhibitors · Aluminium · Petroleum fractions · Adsorption · Electrochemical impedance

### Introduction

Hydrochloric acid (HCl) solutions are often used for industrial acid cleaning, chemical or electrochemical etching, and acid pickling of aluminium and its alloys. It is very important to add a corrosion inhibitor to decrease the corrosion rate of aluminium in such solutions. Several authors [1–5] have studied the corrosion of

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