

THE EFFECT OF CORROSION INHIBITORS ON FRICTION

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ABSTRACT

Lubricants are multi-component fluids. They are designed simultaneously to fulfil multiple roles by incorporation of various additives. Depending on their functions, some of these additives are surface active and thus can be used as friction modifiers and also corrosion inhibitors. It is commonly believed that their effectiveness might depend on their ability of forming homogeneous surface films. Since both corrosion inhibitor and friction modifier compete for surface sites, ideally it would be more efficient if we can have one additive that can function as both. Hence the objective of this work is to investigate if commonly used corrosion inhibitors can be used as effective friction modifiers.

This presentation is divided into two parts. The first part concerns surface film formation and hence to explore the packing mechanism of corrosion inhibitor. This is important for both corrosion resistance and friction reduction. Atomic force microscopy (AFM) with a liquid cell is used to visualise

surface film formation in various additive concentrations and temperatures. The nature of surfaces is also investigated. The surface adsorption of additives are also examined with quartz crystal microbalance.

The second part of the presentation focuses on friction reduction effectiveness of the additive coated surface. This is obtained with the use of colloidal probe. Frictional properties of corrosion inhibitors are also examined with a conventional tribometer. These two tests give friction responses of corrosion inhibitors at different length scales and their friction results are compared. These results are then correlated with the adsorbed film morphology. It is hoped that this work will shed light to the potential of using corrosion inhibitors as friction modifiers, how surfaces and test conditions affect their effectiveness.

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