Corrosion Rate Prediction Using Statistics to Improve Maintenance

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Abstract: Corrosion rate is one of the most important input parameters in corrosion prediction models for refining process. Its accurate assessment and/or prediction is therefore required if the damage prediction models are to be reliably used to predict both the rate and severity of damage and to plan for maintenance of structures of these processes. This study is an attempt to predict the corrosion rate of heavy crude oil on primary refining process, such as atmospheric distillation by conducting experiments using a general full factorial design and linear regressions models used as an alternative to predict deterioration in steels. The study is based on the results of a mixture of heavy and light crude oils in combination with different types of stainless steels. Refining heavy crude oils with high sulphur content and other pollutants exposes the steel to corrosion caused by environmental conditions during operations, due to the presence of sulfuric acid, naphthenic acid and the total acid number (TAN) of the crude oil. The main parameters in corrosion control are flow, concentration of sulphur species, total acid number (TAN), temperature, and chromium content. However it is not easy to know the combined effect of different variables due to interaction effects.

Keywords: Statistical model, linear regression, heavy crude oil, corrosion, refining.