

Abstract

In this study, the CCD response surface methodology was used to model and optimise the performance of *Lasienthera africanum* leaves extract (LALE) as a corrosion inhibitor on mild steel. The experimental parameters were assessed at different immersion time and inhibitor concentration to determine the optimum conditions for corrosion mitigation. Using experimental results of the corrosion characteristics such as the weight loss, corrosion rate, and inhibition efficiency of LALE, new models were developed, the significance of which was tested using variance analysis. The developed RSM models of WL, CR, and IE were accurate and reliable, and their P-values were 0.0001, which is less than 0.05. Likewise, the R² -statistics (R² , adjusted-R² , and predicted-R²), adequate precision, and diagnostic plots were also used as a means to ascertain the degree of accuracy and adequacy of the WL, CR, and IE models. In addition, optimization of the corrosion inhibition process for LALE revealed that the optimum conditions for maximum IE, minimum WL, and CR were achieved at a concentration of 93.93 ppm and an immersion time of 228 hrs. Under these settings, the inhibition efficiency, weight loss, and corrosion rate were 93.85%, 0.294g and 3.267 mm/y, respectively. Therefore, the models are considered ideal for prediction with a confidence level of 95%, and the optimal combination is suitable for the corrosion inhibition process design. Hence these models can be recommended for applications such as oil well acidizing and pickling pipelines