

## Application of Response Surface Methodology to Optimize the Factor Influencing the Wax Deposition of Malaysian Crude Oil

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**Abstract :** Wax deposition in production pipelines and transportation tubing from offshore to onshore is critical in the oil and gas industry due to low-temperature conditions. It may lead to a reduction in production, shut-in, plugging of pipelines and increased fluid viscosity. The most significant popular approach to solve this issue is by injection of a wax inhibitor into the channel. This research aims to determine the amount of wax deposition of Malaysian crude oil by estimating the effective parameters using (Design-Expert version 7.1.6) by response surface methodology (RSM) method. Important parameters affecting wax deposition such as cold finger temperature, inhibitor concentration and experimental duration were investigated. It can be concluded that SA-co-BA copolymer had a higher capability of reducing wax in different conditions where the minimum point of wax reduction was found at 300 rpm, 14°C, 1h, 1200 ppm. The amount of waxes collected for each parameter were 0.12g. RSM approach was applied using rotatable central composite design (CCD) to minimize the wax deposit amount. The regression model's variance (ANOVA) results revealed that the R<sup>2</sup> value of 0.9906, indicating that the model can be clarified 99.06% of the data variation, and just 0.94% of the total variation were not clarified by the model. Therefore, it indicated that the model is extremely significant, confirming a close agreement between the experimental and the predicted values. In addition, the result has shown that the amount of wax deposit decreased significantly with the increase of temperature and the concentration of poly (stearyl acrylate-co-behenyl acrylate) (SABA), which were set at 14°C and 1200 ppm, respectively. The amount of wax deposit was successfully reduced to the minimum value of 0.01 g after the optimization.

**Keywords :** wax deposition, SABA inhibitor, RSM, operation factors

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