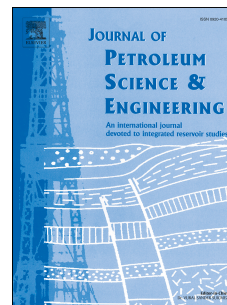


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# The Effect of Gas flow rate on the Wax Deposition in Oil-gas Stratified Pipe Flow

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**Abstract:** Wax deposit becomes more complicated in oil-gas two-phase pipe flow than single phase flow, and therefore remains poorly understood. The increasing trend of deposit with an increasing gas flow rate has been observed in wax deposit experiments under oil-gas stratified pipe flow. In this study, a numerical method is used to clarify this trend by quantitatively analyzing the heat and mass transfer during wax deposit building up. The method was able to predict the experimentally observed trend of deposit without any adjustable parameter. It was found that there are four effects to affect wax deposit when the gas flow rate changed. These four effects focus on the flow, heat and mass transfer characteristic at the oil-deposit interface, which include the effect of oil wetted area, the wax diffusivity, the boundary layer thickness, and the concentration difference between bulk oil and oil-deposit interface on mass transfer. Furthermore, the overall growth behavior of the wax deposit is the consequence of the competition between these four effects as time progresses. These results provided important insight about the effects of the gas flow rate on the wax deposit in oil-gas stratified pipe flow.

**Keywords:** Oil/gas stratified smooth flow, Petroleum, Fluid mechanics, Deposition mechanism, Computational simulation

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