

## **Effect of wax inhibitor and sodium cloisite, Na<sup>+</sup> nanoparticle on wax deposition of Malaysian crude oil through cold finger analysis**

*Priyatchni Subramanie, Shamala Devi Vijayakumar & Norida Ridzuan*

Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang, Gambang,  
Pahang, Malaysia

### **ABSTRACT**

Wax deposits are undesirable as they affect crude oil production. Wax inhibitor which changes crude oil properties like pour point, viscosity and wax appearance temperature (WAT) are used by oil industries. The efficiency of wax inhibitor poly (ethylene-co-vinyl acetate) (EVA), poly (maleic anhydride-alt-1-octadecene) (MA) and sodium cloisite Na<sup>+</sup> nanoparticle (NP) is assessed in this research to determine their effects on the wax deposition of Malaysian crude oil. Cold finger analysis was used to identify the best inhibitor to prevent the wax formation. The highest paraffin inhibition efficiency (PIE) obtained was at 80.91% when the crude oil was treated with EVA/NP blend of 1000 ppm EVA and NP of 600 ppm. The minimum amount of wax formed was at 25 °C proving that cold finger temperature plays a crucial role in altering the wax deposition. The van der Waals (vdW) molecular interaction between wax molecules and wax inhibitor was studied with molecular dynamics simulation (MD). The radial distribution function (rdf) value shifted from 2.75 Å to 3.25 Å when EVA/NP blend was used as the inhibitor, supporting the experimental data. The EVA/NP blend offers significant effect in reduction of wax deposit amount.

### **KEYWORDS**

Cold finger analysis; EVA; MA; MD simulation; Nanoparticle; Wax deposition

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