

UNIVERSITI TEKNOLOGI MARA

**THE INVESTIGATION ON THE
DEGREE OF INHIBITION OF MAC
AND DEA INHIBITORS DURING
WAX DEPOSITION**

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ABSTRACT

Deposition of wax can cause a serious problem to the flow of the crude oil in the pipeline. Chemical methods will be applied in the crude oil industry to reduce wax deposition in transportation of crude oil through pipeline in subsea conditions. Maleic Anhydride Copolymer (MAC) and Diethanolamine (DEA) are used in this investigation to estimate the performance as an effective wax inhibitor at different temperature ranging from 5°C to 15°C and concentration ranging from 500 to 5000 ppm using cold finger apparatus equipped with an agitator. 10 mL of MAC and DEA were added into the cold finger apparatus and water bath temperature surrounding the vessel at 50 °C. The deposited wax will be scrapped and weighed. The rotation speed was fixed at 400 rpm. Based on the amount of wax deposit weight, MAC is chosen as the most effective inhibitor compared to DEA. The weight of the wax deposition are able to be reduced when using MAC.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Wax deposition in subsea pipelines is a complicated occurrence that has brought many hindrances in the production, transportation and refining of crude oil in the industry of petroleum. This phenomena occurs due to the decrease in the temperature and pressure during the oil production operations which caused the precipitation wax crystal to form from crude oil and deposit onto the walls of the pipeline.

Study had found that saturates or known as n-paraffin are the major constituents to wax deposition. If the temperature and pressure decreases, the solubility of the n-paraffin will be decreases. This will lead to the deposition of wax precipitates that has the probable to create crystalline net capable of entrapping liquid crude oil. Furthermore, the temperature gradient that exist between pipeline walls and the bulk fluid temperature driven by the molecular diffusion mechanism will then cause the deposition of the wax to happen on the surface of the pipeline walls.

Chemical additives or known as inhibitors are one of the wax prevention approach that is implemented by petroleum production industries to reduce the occurrence of pigging. Wax inhibitor such as wax dispersants and pour point dispersant are used to modify the wax solid structure chemically hence decreasing the tendency of the wax crystals to interlock and form dimensional networks growth (Pedersen & Rønningsen, 2003).

Pour point depressant and wax dispersants are under the same class of chemical additives but their roles differs widely from one to another. Pour point depressant is known as wax crystal modifier functions by co-crystallizing into the paraffin structure through Van der Waals forces leaving the polar functional group to produce a steric hindrance to interfere with the alignment of new incoming wax molecules while wax dispersants function works by absorbing itself to the wax crystals, inhibiting crystal