ABSTRAK

STUDI PENAMBAHAN ASAP CAIR CANGKANG KELAPA SAWIT DAN EKSTRAK BUAH MENGKUDU (M*orinda citrifolia*) SEBAGAI INHIBITOR KERAK KALSIUM KARBONAT ($CaCO_3$)

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Pembentukan kerak menjadi masalah serius yang dihadapi sebagian besar bidang industri. Penumpukan kerak seperti kalsium karbonat ($CaCO_3$) akan mengurangi efesiensi proses aliran fluida dan mempersempit diameter pipa. Oleh karena itu, dalam penelitian ini telah dilakukan pengujian inhibitor campuran asap cair cangkang kelapa sawit dan ekstrak mengkudu (AM) untuk menghambat pertumbuhan kerak $CaCO_3$ menggunakan metode *seeded experiment*. Larutan pertumbuhan $CaCO_3$ sebesar 0,0250; 0,0375; 0,0500; dan 0,0675 M diujikan pada variasi perbandingan konsentrasi inhibitor AM 5:2, 5:4, 5:6, dan 5:8.

Nilai persentase efektifitas yang paling tinggi yaitu pada inhibitor dengan perbandingan konsentrasi inhibitor campuran AM 5:8 terhadap larutan pertumbuhan dengan konsentrasi 0,0250 M sebesar 160,15 %. Hasil karakterisasi menggunakan *Scanning Electron Miscrocopy* (SEM) setelah ditambahkan inhibitor morfologi kristal $CaCO_3$ didominasi aroganit dan muncul fasa veterit. Analisis menggunakan *X-Ray Diffraction* (XRD) setelah penambahan inhibitor menunjukkan adanya penurunan intensitas dengan perbedaan fasa kristal dari kristal *hardscale* (kalsit) menjadi softscale (aragonit dan vaterit). Analisis menggunakan *Particle Size Analyzer* (PSA) menunjukkan bahwa kerak $CaCO_3$ sebelum dan setelah penambahan inhibitor mengalami penurunan ukuran kristal yakni nilai rata-rata (*mean*) dari 70,92 μm menjadi 53,12 μm dan nilai tengah (*median*) dari 29,28 μm menjadi 19,27 μm.

Kata Kunci: Mengkudu, inhibitor, $CaCO_3$, kerak

ABSTRACT

STUDY OF THE ADDITION OF LIQUID SMOKE FROM PALM SHELLS AND NONI FRUIT EXTRACT (Morinda citrifolia) AS CALCIUM CARBONATE ($CaCO_3$) SCALE INHIBITORS

By

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Scale formation is a serious problem faced by most industrial fields. The accumulation of scale such as calcium carbonate ($CaCO_3$) will reduce the efficiency of the fluid flow process and narrow the pipe diameter. Therefore, in this study, a test of a mixture of liquid smoke inhibitors from palm shells and mengkudu extract (AM) was conducted to inhibit the growth of $CaCO_3$ scale using the seeded experiment method. $CaCO_3$ growth solutions of 0.0250; 0.0375; 0.050; and 0.0675 M were tested at variations in the AM inhibitor concentration ratio of 5:2, 5:4, 5:6, and 5:8. The highest percentage of effectiveness was in the inhibitor with a mixture of AM inhibitor concentration ratio of 5:8 to the growth solution with a concentration of 0.0250 M of 160.15%. The results of characterization using Scanning Electron Miscrocopy (SEM) after the addition of inhibitors, the $CaCO_3$ crystal morphology was dominated by aroganite and the veterite phase appeared. Analysis using X-Ray Diffraction (XRD) after the addition of inhibitors showed a decrease in intensity with a difference in crystal phase from hardscale crystals (calcite) to softscale (aragonite and vaterite). Analysis using Particle Size Analyzer (PSA) showed that the $CaCO_3$ crust before and after the addition of inhibitors experienced a decrease in crystal size, namely the average value (mean) from 70.92 μm to 53.12 μm and the middle value (median) from 29.28μm to 19.27 μm.

Keywords: Noni, inhibitor, $CaCO_3$, scale