

ABSTRAK

STUDI PENAMBAHAN CAMPURAN ASAP CAIR CANGKANG KELAPA SAWIT DAN EKSTRAK DAUN ALPUKAT SEBAGAI INHIBITOR KERAK KALSIUM SULFAT (CaSO_4)

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Pembentukan kerak kalsium sulfat dalam pipa menyebabkan hambatan aliran fluida dan menjadi faktor kerugian. Oleh karena itu, dalam mengatasi permasalahan tersebut penelitian ini dilakukan dengan menguji efektivitas inhibitor kerak yang berasal dari campuran asap cair cangkang kelapa sawit dan ekstrak daun alpukat dengan menggunakan metode penambahan bibit kristal (*seeded experiment*) pada konsentrasi larutan pertumbuhan CaSO_4 yang digunakan yaitu 0,025; 0,038; 0,050; dan 0,063 M serta variasi konsentrasi inhibitor 5:1; 5:3; 5:5; dan 5:7.

Efektivitas tertinggi terjadi pada konsentrasi larutan pertumbuhan kristal CaSO_4 0,025 M dan konsentrasi inhibitor yang ditambahkan 5:7 dengan presentase efektivitas sebesar 83,19%. Berdasarkan analisis menggunakan *Scanning Electron Microscopy* (SEM) dan *X-Ray Diffraction* (XRD) menunjukkan bahwa kristal CaSO_4 tanpa penambahan inhibitor berukuran besar, tidak berlapis, padat, tajam, yang terdiri dari fasa gipsum dan basanit, sedangkan dengan penambahan inhibitor kristal CaSO_4 memiliki fasa baru berukuran kecil, pendek, dan berserabut yaitu fasa anhidrit. Analisis menggunakan *Particle Size Analyzer* (PSA) menunjukkan terjadi penurunan ukuran partikel kerak CaSO_4 berdasarkan nilai rata-rata (*mean*) dan nilai tengah (*median*) setelah adanya penambahan inhibitor.

Dengan demikian, dapat disimpulkan bahwa inhibitor campuran asap cair cangkang kelapa sawit dan ekstrak daun alpukat dapat digunakan sebagai penghambat pertumbuhan kerak CaSO_4 .

Kata kunci: Asap cair cangkang kelapa sawit, ekstrak daun alpukat, inhibitor, CaSO_4 , kerak

ABSTRACT

STUDY ON THE ADDITION OF A MIXTURE OF PALM SHELL LIQUID SMOKE AND AVOCADO LEAF EXTRACT AS AN INHIBITOR OF CALCIUM SULFATE (CaSO₄) SCALE

By

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Formation of calcium sulfate (CaSO₄) scale in pipes causes fluid flow resistance and leads to losses. Therefore, to address this issue, this study was conducted to evaluate the effectiveness of a scale inhibitor derived from a mixture of palm shell liquid smoke and avocado leaf extract using the seeded experiment method. The calcium sulfate growth solution concentrations used were 0.025; 0.038; 0.050; and 0.063 M, with inhibitor concentration variations of 5:1; 5:3; 5:5; and 5:7. The highest effectiveness was observed at a crystal growth solution concentration of 0.025 M and an inhibitor concentration of 5:7, achieving an effectiveness percentage of 83.19%. Analysis using Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) indicated that CaSO₄ crystals without the inhibitor were large, non-layered, dense, and sharp, consisting of gypsum and bassanite phases. In contrast, the CaSO₄ crystals with the inhibitor formed a new phase that was small, short, fibrous, and non-layered, identified as the anhydrite phase. Furthermore, Particle Size Analyzer (PSA) analysis revealed a reduction in CaSO₄ scale particle size based on both the mean and median values after inhibitor addition. Thus, it can be concluded that the inhibitor derived from a mixture of palm shell liquid smoke and avocado leaf extract can effectively inhibit CaSO₄ scale formation.

Keywords: Palm shell liquid smoke, avocado leaf extract, inhibitor, CaSO₄, scale formation