

INTISARI

Serat sabut kelapa yang dikenal memiliki sifat kuat, ulet, elastis, tahan suhu tinggi dan tidak mudah lapuk berpotensi diolah lebih lanjut menjadi media filtrasi. Serat sabut kelapa cocok diaplikasikan menjadi media filtrasi jenis *Deep-bed filtration*. Prinsip kerja *Deep-bed filtration* adalah apabila fluida mengalir melalui filter maka padatan partikulat pengotor tertahan dan terkumpul di sela-sela rongga *porous* yang terbentuk diantara sekumpulan serat media filtrasi. Contoh aplikasi *Deep-bed filtration* di industri adalah filter pasir sumur minyak bumi yang menggunakan serat wool baja sebagai media filtrasi. Partikulat padatan pasir formasi yang terikut aliran minyak bumi ditangkap dan tertahan didalam sela-sela rongga *porous* diantara serat wool baja. Filter pasir ini bekerja optimal apabila memiliki nilai permeabilitas tinggi, kemampuan filtrasi yang baik dan ketahanan terhadap kondisi lingkungan operasi.

Penelitian ini difokuskan dalam melihat karakteristik permeabilitas serat dan kemampuan serat sabut kelapa terhadap kondisi operasi sumur minyak bumi dengan suhu reservoir 150 °C serta proses perendaman larutan asam HCl 7,5% selama 12 Jam. Pengujian karakteristik permeabilitas serat sabut kelapa dilakukan dengan membuat core spesimen uji permeabilitas berukuran diameter 3,8 cm, panjang 7 cm dan dengan variasi massa serat sabut kelapa spesimen uji 7,5; 10; 15; 17,5 dan 20 gram. Kemudian masing-masing spesimen uji core ini diukur nilai permeabilitasnya menggunakan alat *permeability meter* AFS200. Sedangkan pengujian kekuatan serat sabut kelapa dilakukan dengan menguji tarik serat tunggal sabut kelapa setelah dilakukan proses perendaman larutan HCl dan proses penguapan. Satu kelompok spesimen uji serat tunggal sabut kelapa dilakukan proses perlakuan perendaman larutan HCl 7,5% selama 3, 6, 9, 12, 15, 18, 21 dan 24 jam. Kemudian kelompok kedua spesimen uji serat tunggal dilakukan proses perlakuan uap panas suhu 120, 140, 160 dan 180 °C selama 1 jam. Dan kelompok ketiga spesimen uji serat tunggal dilakukan proses perlakuan perendaman larutan HCl 7,5% selama 3, 6, 12, dan 24 jam dan dilanjutkan proses perlakuan uap panas suhu 120, 140, 160 dan 180 °C selama 1 jam.

Hasil penelitian menunjukkan nilai permeabilitas serat sabut kelapa menurun seiring bertambahnya massa serat sabut kelapa yang digunakan untuk membuat core spesimen uji, nilai permeabilitas paling rendah 8500 miliDarcy untuk spesimen uji massa sabut 20 gram. Proses penguapan uap panas suhu tinggi menurunkan kekuatan tarik serat tunggal sabut kelapa seiring bertambahnya suhu penguapan, penurunan nilai rata-rata kekuatan tarik serat paling rendah sebesar 75% untuk proses penguapan suhu 180 °C selama 1 Jam. Proses perendaman larutan HCl 7,5% menurunkan kekuatan tarik serat tunggal sabut kelapa seiring bertambahnya durasi waktu perendaman dengan penurunan nilai rata-rata kekuatan tarik serat paling rendah sebesar 32% untuk proses perendaman selama 24 Jam. Dan kombinasi proses penguapan uap panas suhu tinggi dan perendaman larutan HCl 7,5% menurunkan kekuatan tarik serat tunggal sabut kelapa seiring bertambahnya suhu penguapan dan bertambahnya durasi waktu perendaman HCl, penurunan nilai rata-rata kekuatan tarik serat paling rendah sebesar 66% untuk proses penguapan suhu 180 °C selama 1 jam.

Kata Kunci: Serat sabut kelapa, Filter pasir, Permeabilitas, Perlakuan Uap, Perendaman HCl, Kekuatan Tarik

ABSTRACT

Coconut coir known as strong, ductile, elastic, resistant to high temperatures and slow weathered material potentially processed as filter medium. The coir is suitable to be applied as a filter medium of Deep Bed Filtration type. The working principle of Deep-bed filtration is when the filtrate fluid flows through the filter, the impurities particulate solids will be retained and collected in between the porous cavities that formed by group of filtration media fibers. A Deep-bed filtration application in the industry found on oil well sand filter that uses steel wool fibers as the filtration medium. The particulates of solid sand flows with liquid oil from reservoir will be retain in between the porous cavities of steel wool fibers. This sand filter will work optimally if has a high permeability value, good filtration ability and resistance to operating conditions.

This research focused on characterization of coir permeability and coconut coir fibers resistances to operating conditions of oil well with reservoir temperature of 150 °C and 7.5% HCl acid solution soaking process for 12 hours. The permeability characterization process of coconut coir fiber was carried out by making a core specimen with a diameter of 3.8 cm, 7 cm in length and variable in weight of the coir fiber in every specimen for 7.5, 10, 15, 17.5, and 20 grams. Then the permeability core specimen measured using permeability meter AFS200. While the resistance of coconut coir fibers is carried out by perform tensile strength of the single fiber of coconut coir after steaming and HCl acid treatment process. First group of single fiber coir treated by soaking on 7.5% HCl solution for 3 hours, 6 hours, 9 hours, 12 hours, 15 hours, 18 hours, 21 hours, 24 hours. The second group specimen experienced on steam treatment process at temperature of 120, 140, 160 and 180 °C for 1 hour. And the third group of single fiber coir specimens subjected to combination treatment process of soaking on 7.5% HCl solution for 3 hours, 6 hours, 12 hours, 24 hours and steaming treatment process at temperature of 120, 140, 160 and 180 °C for 1 hour.

The results showed the permeability value of coconut coir decreased along with the increasing of coir fiber weight used to developing the core specimen, the lowest permeability value recorded at 8500 millidarcy for 20-gram coir specimen. The steaming process reducing the tensile strength of the single coir fiber as the increasing of steam temperature, the decreasing value of average tensile strength was 75% for steaming at 180 °C for 1 hour. The soaking process of 7.5% HCl solution lowering the tensile strength of the single coir fiber along with the increasing of soaking time duration, the decreasing value of average tensile strength was 32% for 24 hours soaking process. And the combination of steaming and 7.5% HCl solution soaking process reducing the tensile strength of the single coir fiber as increasing the steam temperature and increasing the soaking time duration, the decreasing value of average tensile strength was 66% for treatment on 180 °C steam temperature for 1 hour.

Keywords: Coconut coir fiber, Sand filter, Permeability, Steam, Soaking on HCl, Tensile Strength