

ABSTRAK

POTENSI KERAMIK GRANUL BERPORI DARI TANAH LIAT BENTONIT UNTUK PEMURNIAN MINYAK SAWIT MENTAH

Keramik berpori memiliki struktur pori kecil, sehingga memiliki kemampuan adsorpsi yang baik terhadap berbagai zat. Keramik granul berpori dari tanah liat bentonit berpotensi sebagai adsorben ramah lingkungan dalam proses pemurnian minyak sawit mentah (*Crude Palm Oil/CPO*). Penelitian ini bertujuan untuk menghasilkan keramik granul berpori dengan karakteristik fisik dan morfologi yang sesuai untuk aplikasi adsorpsi, serta mengevaluasi efektivitasnya dalam menurunkan kadar air, asam lemak bebas (ALB), dan β -karoten pada CPO. Keramik dibuat dengan metode plastis menggunakan bentonit, pasir silika 10%, serta variasi arang sekam padi dan *cocopeat* sebesar 0%, 5%, 10%, 20%, dan 25% dari massa bentonit. Aktivasi bentonit dilakukan secara fisika pada suhu 300 °C selama 6 jam. Proses pembakaran keramik dilakukan pada suhu 1000 °C selama 7 jam. Karakterisasi dilakukan menggunakan *X-Ray Diffraction* (XRD), *Scanning Electron Microscope* (SEM), dan uji sifat fisis seperti kadar air, densitas, porositas, daya serap air, dan kekerasan skala Mohs. Kemudian uji potensi adsorpsi terhadap CPO dilakukan sesuai parameter mutu SNI 01-2901-2006 untuk kadar air dan asam lemak bebas, serta kadar β -karoten dengan spektrofotometri UV-Vis. Hasil optimal ditunjukkan oleh variasi KGBA 20% dengan kristalinitas 68,64%, kadar air 0,0497%, densitas 1,76 g/cm³, porositas 55,85%, daya serap air 66,37%, dan kekerasan 4 skala Mohs. KGBA 20% mampu menurunkan kadar air minyak hingga 0,288%, ALB menjadi 4,069 mg KOH/g, dan kadar β -karoten menjadi 194,98 mg/L. Massa adsorben optimum sebesar 0,8 g dan waktu kontak optimum selama 90 menit. Model adsorpsi mengikuti isoterm Freundlich dengan nilai R^2 sebesar 0,9755. Hasil ini menunjukkan bahwa keramik granul berpori dari tanah liat bentonit memiliki potensi tinggi sebagai adsorben ramah lingkungan untuk pemurnian minyak sawit mentah atau CPO.

Kata-kata kunci: keramik berpori; bentonit; adsorben; minyak sawit mentah; pemurnian minyak.

ABSTRACT

POTENTIAL OF POROUS GRANULE CERAMICS FROM BENTONITE CLAY FOR CRUDE PALM OIL PURIFICATION

Porous ceramics have a small pore structure, giving them good adsorption capabilities for various substances. Porous bentonite clay granules have the potential to be used as environmentally friendly adsorbents in the purification process of Crude Palm Oil (CPO). This study aims to produce porous ceramic granules with physical and morphological characteristics suitable for adsorption applications, as well as to evaluate their effectiveness in reducing water content, free fatty acids (FFA), and β -carotene in CPO. The ceramics were produced using the plastic method with bentonite, 10% silica sand, and variations of rice husk charcoal and cocopeat at 0%, 5%, 10%, 20%, and 25% of the bentonite mass. Bentonite activation was performed physically at 300°C for 6 hours. The ceramic firing process was carried out at 1000 °C for 7 hours. Characterization was performed using X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), and physical property tests such as moisture content, density, porosity, water absorption capacity, and Mohs hardness. Then the adsorption potential test for CPO was conducted according to the quality parameters of SNI 01-2901-2006 for moisture content and free fatty acid content, as well as β -carotene content using UV-Vis spectrophotometry. Optimal results were shown by the 20% KGBA variant with crystallinity of 68,64%, moisture content of 0,0497%, density of 1,76 g/cm³, porosity of 55,85%, water absorption capacity of 66,37%, and hardness of 4 on the Mohs scale. The 20% KGBA reduced the oil moisture content to 0,288%, ALB to 4,069 mg KOH/g, and β -carotene content to 194,98 mg/L. The optimum adsorbent mass was 0,8 g, and the optimum contact time was 90 minutes. The adsorption model followed the Freundlich isotherm with an R^2 value of 0,9755. These results indicate that porous ceramic granules from bentonite clay have high potential as an environmentally friendly adsorbent for the purification of Crude Palm Oil (CPO).

Keywords : porous ceramic; bentonite; adsorbent; crude palm oil (CPO); oil purification.