

Pembuatan karbon aktif termodifikasi NiO dari cangkang kelapa sawit sebagai CO₂ scrubber pada controlled atmosphere storage = Preparation of NiO-modified activated carbon from palm kernel shells as CO₂ scrubber in controlled atmosphere storage

Muhammad Jihadilan Aliansyah Putra, author

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Abstrak

Controlled Atmosphere Storage memiliki CO₂ Scrubber yang dapat dikembangkan melalui pengembangan adsorben karbon aktif. Produksi karbon aktif dapat dibuat dengan bahan baku biomassa, salah satunya ialah cangkang kelapa sawit yang memiliki kandungan karbohidrat struktural lignin (53,85%), hemiselulosa (26,16%), dan selulosa (6,92%). Produksi karbon aktif berbahan baku cangkang kelapa sawit melalui mekanisme preparasi bahan baku. Langkah pertama adalah aktivasi kimia dengan merendamkan cangkang kelapa sawit dalam larutan KOH selama 24 jam dan dilanjutkan dengan karbonisasi pada suhu 350°C. Lalu aktivasi kimia kedua dengan variasi rasio KOH : karbon aktif 2:1 dan 4:1 sebelum diaktivasi secara fisika menggunakan gas N₂ dengan laju alir 150 ml/menit selama 60 menit pada suhu 800 °C. Hasil karbon aktif terbaik didapat pada rasio 2:1 dengan Bilangan Iod, Luas Permukaan, dan yield berturut-turut 1216,28 mg/g; 1209,78 m²/g; dan 39,01%. Modifikasi karbon aktif yang bertujuan meningkatkan kemampuan adsorpsi CO₂ dilakukan dengan perendaman dalam larutan logam NiO dengan variasi loading 0,5%, 1%, dan 2%. Hasil adsorpsi gas CO₂ dengan gas analyzer terbaik didapat pada variasi loading 2% dengan presentase adsorpsi sebesar 19,1%.

.....Controlled Atmosphere Storage has a CO₂ Scrubber that can be improved through the development of activated carbon adsorbents. The production of activated carbon can be made with biomass raw materials, one of which is a palm kernel shell which has structural carbohydrate content of lignin (53.85%), hemicellulose (26.16%), and cellulose (6.92%). Production of activated carbon made from palm kernel shells is through the mechanism of preparation of raw materials. The first step is chemical activation by immersing the palm kernel shell in a KOH solution for 24 hours and followed by carbonization at 350 °C. Then the second chemical activation with a variation of the ratio of KOH: activated carbon 2:1 and 4:1 before being physically activated using N₂ gas with a flow rate of 150 ml /min for 60 minutes at a temperature of 800 °C. The best activated carbon yield was obtained at a ratio of 2:1 with Iodic Number, Surface Area, and yield respectively 1216.28 mg/g; 1209.78 m²/g; and 39.01%. Modification of activated carbon which aims to increase the ability of CO₂ adsorption is done by immersion in a NiO metal solution with loading variations of 0.5%, 1%, and 2%. The best result of CO₂ gas adsorption with gas analyzer were obtained at a loading variation of 2% with an adsorption percentage of 19.1%.</i>