TESIS

Pengaruh Bahan Pengaktif dan Suhu Aktivasi terhadap Karakteristik Adsorpsi Isoterm CO_2 Arang Sekam Padi

Untuk Memenuhi Persyaratan Menyelesaikan

Pendidikan Tahap Magister

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Abstrak

Konsentrasi gas karbon dioksida (CO_2) di atmosfer terus meningkat tiap tahun, terutama disebabkan oleh aktivitas manusia seperti pembakaran bahan bakar fosil untuk energi, proses industri dan transportasi. Pengembangan riset pengurangan gas CO_2 terus dilakukan salah satunya dengan proses adsorpsi menggunakan adsorben. Penelitian dilakukan dengan melihat akibat variasi bahan pengaktif dan suhu aktivasi terhadap adosorben sebagai penyerap CO_2. Adsorben karbon aktif yang digunakan berasal dari sekam padi yang dikarbonisasi melalui metode pirolisis. Pembuatan adsorben dilakukan dengan memvariasikan jenis bahan pengaktif (KOH, Urea, dan KOH+urea) dan suhu aktivasi (600°C, 700°C dan 800°C). Pengamatan dengan *Scanning Electron Microscopy* (SEM) menunjukkan dugaan terdapat silika pada permukaan adsorben sehingga menghambat terjadinya adsorpsi CO_2 yang mengakibatkan kapasitas adsorpsi CO_2 menjadi rendah. Kondisi optimum pembuatan arang aktif sekam padi ditentukan pada suhu aktivasi 700°C dengan bahan pengaktif KOH. Berdasarkan pengukuran dengan Belsorp/BET menghasilkan luas permukaan spesifik, volume adsorpsi optimum, dan diameter pori rata-rata masing-masing 825 m^2/g, 0,446 cm^3/g, dan 0,6814 nm.

Kata kunci: CO_2, adsorpsi, arang sekam padi, adsorpsi isoterm

Abstract

The concentration of carbon dioxide gas (CO_2) in the atmosphere continues to increase every year, mainly due to human activities such as burning fossil fuels for energy, industrial processes, and transportation. The development of CO_2 gas reduction research continues to be carried out, one of which is the adsorption process using an adsorbent. The research was conducted by looking at the effects of variations in activating agent and activation temperature on adsorbent as a CO_2 adsorber. The activated carbon adsorbent used comes from carbonized rice husks through the pyrolysis method. The adsorbent was prepared by varying the type of activating agent (KOH, Urea, and KOH+urea) and the activation temperature (600℃, 700℃, and 800℃). Observations by Scanning Electron Microscopy (SEM) showed that contained silica on the surface of the adsorbent, thereby inhibiting CO_2 adsorption which resulted in a low CO_2 adsorption capacity. The optimum conditions for making rice husk-activated charcoal were determined at an activation temperature of 700℃ with the activating agent KOH. Based on measurements with Belsorp/BET, the optimum specific surface area optimum adsorption volume, and average pore diameter were 825 m^2/g, 0.446 cm^3/g, and 0,6814 nm, respectively.

Keywords: CO_2, adsorption, rice husk charcoal, adsorption isotherm.