

Studi Pemanfaatan Limbah Biomassa sebagai Raw Material Adsorben SiC dalam Penurunan Konsentrasi Amonia dan Sulfida sebagai Parameter Bau dalam Air Limbah = Study of Utilization Biomass Waste as SiC Adsorbent Raw Material in Decreasing Ammonia and Sulfide Concentration as Odor Parameter in Wastewater

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Abstrak

Biomassa sebagai raw material merupakan salah satu solusi yang dapat dikembangkan dalam pengelolaan limbah hasil pertanian, perkebunan, dan industri agar pencemaran lingkungan dapat diminimalisasi. Penelitian ini dilakukan untuk membuat adsorben Silikon Carbida (SiC) dari serbuk gergaji kayu Sengon sebagai sumber karbon dan sabut kelapa sebagai sumber silika. Metode penelitian meliputi isolasi silika, isolasi karbon, pembuatan adsorben SiC secara reduksi magnesiotermik dan karakterisasi menggunakan XRD, SEM-EDX, dan FTIR. Adsorben optimum dalam penurunan konsentrasi amonium dalam limbah simulasi NH_4OH yaitu adsorben SiC 136 dengan bobot optimum 0,1 g; konsentrasi limbah simulasi optimum 20 mg/L; waktu kontak optimum 120 menit dan pH optimum pada pH 6. Sedangkan adsorpsi sulfida optimum dalam limbah simulasi Na_2S yaitu adsorben SiC 533 dengan bobot optimum 0,3 g; konsentrasi limbah simulasi optimum 30 mg/L; waktu kontak optimum 150 menit dan pH optimum pada pH 7. Aplikasi adsorben SiC pada air limbah industri nata de coco menunjukkan bahwa adsorben SiC 136 mampu menurunkan amonium sebesar 60,84 % dengan kapasitas adsorpsi 0,34 mg/g. Sedangkan SiC 533 mampu menurunkan konsentrasi sulfida sebesar 92,62 % dengan kapasitas adsorpsi 0,90 mg/g. Proses adsorpsi amonium dan sulfida oleh adsorben SiC mengikuti pola isoterm Freundlich yang berarti proses adsorpsi berlangsung secara fisika.

.....Biomass as raw material was one solution that can be developed in the management of agricultural, plantation and industrial waste so that the environment pollution can be minimized. This research was conducted to make Silicon Carbide (SiC) adsorbent from Sengon sawdust as a source of carbon and coconut husk as a source of silica. The research methods include silica isolation, carbon isolation, manufacture of SiC adsorbent by magnesiothermic reduction and characterizing using XRD, SEM-EDX, and FTIR. The optimum adsorbent in reducing ammonium concentration in NH_4OH as simulation waste was SiC 136 adsorbent with an optimum weight of 0.1 g; optimum simulation effluent concentration 20 mg/L; the optimum contact time was 120 minutes and the optimum pH was at pH 6. While the optimum sulfide adsorption in the Na_2S as simulation waste was SiC 533 adsorbent with an optimum weight of 0.3 g; optimum simulation effluent concentration 30 mg/L; the optimum contact time was 150 minutes and the optimum pH was at pH 7. The application of SiC adsorbent in nata de coco industrial wastewater showed that SiC 136 adsorbent was able to reduce ammonium by 60.84% with an adsorption capacity of 0.34 mg/g. Meanwhile, SiC 533 was able to reduce the sulfide concentration by 92.62% with an adsorption capacity of 0.90 mg/g. The adsorption process of ammonium and sulfide by SiC adsorbent follows the Freundlich isotherm pattern, which means that the adsorption process tends to occur physically.