Development of a cost-effective CO_2 adsorbent using KOH-modified rice husk-based activated carbon for indoor air purification

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A cost-effective CO_2 adsorbent (DKOH-AC) was developed by impregnating KOH on rice husk-based KOH activated carbon (KOH-AC). KOH can be successfully loaded on the surface of KOH-AC. The DKOH-AC showed a considerable BET surface area (206 m^2/g) and smaller pore size (0.739 nm) than those of KOH-AC. KOH-AC quickly reached adsorption equilibrium (about 50 min) whereas DKOH-AC had a longer adsorption time (over 400 min), which resulted in an increase in the adsorption capacity. Higher adsorption capacity (2.73 mmol/g for 15% CO_2, 4.17 mmol/g for 500 ppm CO_2) was obtained with DKOH-AC as compared to that with KOH-AC. In addition, the DKOH-AC showed higher heat of adsorption (16.6 KJ/mol) and gas selectivity than these of KOH-AC. The regeneration condition was found to be 150 ℃ at which both KOH-AC and DKOH-AC exhibited good regeneration performance.