

Shaping metal-organic framework(MOF) with activated carbon and silica powder for selective CO₂ adsorption

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The removal of carbon dioxide from gas/air streams is more often becoming necessary in many industries for different purposes. Carbon dioxide could be removed in several ways such as by chemical separation, membrane separation, cryogenic separation as well as by adsorption, the latter playing a vital role if suitable adsorbent material is available. Activated carbon and silica were selected as base material for pellet making with MOF. We have developed different percentage MOF- activated carbon and MOF-silica pellets for studying the effectiveness of the pellets in carbon dioxide adsorption. Adsorption equilibrium isotherms of CO₂ and N₂ for the MOF-AC and MOF-Silica pellets were measured using a volumetric apparatus at 298K under the pressure range of 0-1 bar. The MOF-AC and MOF- silica pellet samples were characterized to identify surface area, particle size, and thermal stability by using XRD, BET, SEM, and TGA respectively. In addition, we performed the stability test of the MOF-AC Pellet under humid air and acid gases for practical applications because the humid air and acid gases.