

A Promising Environmentally-Friendly Approach To MIL-101(Cr) Synthesis And Its Application For Carbon (Co) Monooxide Separation

VO THE KY, 김진수[†]

경희대학교

(jkim21@khu.ac.kr[†])

Conventionally, MIL -101(Cr) was directly derived from analytically pure trivalent chromium (Cr^{3+}) with the assistance of HF. This work provided for the first time a novel method of HF -free synthesis of MIL -101(Cr) from wastewater model containing high concentration of Cr (VI). Cr(VI) was first reduced by sulfite to obtain Cr(III), and the resulting solution was directly used as precursor for MIL -101(Cr) synthesis under free - HF condition. The synthesized MIL -101(Cr) had BET surface area of $2800 \text{ m}^2 \cdot \text{g}^{-1}$. Gas adsorption (CO , CO_2 , N_2) was tested on the prepared MIL -101(Cr) after doping with various amount of Cu(II) and reduced under vacuum condition to obtain Cu(I)@MIL -101(Cr). The results show that 40Cu(I)@MIL -101(Cr) had high CO uptake capacity of $2.82 \text{ mmol} \cdot \text{g}^{-1}$, which was higher than both CO_2 ($0.80 \text{ mmol} \cdot \text{g}^{-1}$) and N_2 ($0.07 \text{ mmol} \cdot \text{g}^{-1}$). The IAST -predicted CO/CO_2 and CO/N_2 selectivity was 320 and 36 at pressure of 100 kPa, respectively. Regeneration of adsorbent experiments show that the Cu(I)@MIL -101(Cr) had excellent CO adsorption -desorption after 6 cycles.