

A Comparative Study on the Ammonia Adsorption Performance of MIL-101(Cr) in Pressure Swing Adsorption

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Commercial ammonia is produced by Haber-Bosch process, but it requires high temperature and pressure, and consumes high energy. For economically viable process, a number of new processes are under development. Among these, the electrochemical synthesis of ammonia is considered as a future technology that can alternate the Haber-Bosch process. However, this process produces highly diluted ammonia. Nevertheless, further purification may bring a way for commercialization of this process. Thus, development of an adsorbent for ammonia enrichment could be a feasible option. Among various microporous adsorbents including carbons, zeolites and MOFs, MIL-101(Cr) exhibits great prospects for the adsorption of ammonia due to their advantages of structural diversity, modifiable structures and high surface area. In this work, breakthrough tests of ammonia adsorption on MIL-101(Cr) were performed via pressure swing adsorption at different pressures. The results showed that the MIL-101(Cr) have large ammonia uptake at higher adsorption pressure. The MIL-101(Cr) was synthesized by hydrothermal process and characterized using BET, TGA, XRD and NH₃-TPD.