

Carbon dioxide sorption by tetradecylamine supported on silica gel

ABSTRACT

Carbon dioxide emissions generated from fossil fuel-based power plants and other industries has reached 400 ppm in atmosphere. This negatively impact the environment, infrastructures and wildlife in particular. A lot of efforts are needed to produce CO₂ gas sorbent in order to reduce high CO₂ concentration. Therefore, porous silica gel (SG) is modified with amine compound for carbon dioxide capture. Calcinated silica gel functionalized with tetradecylamine (TDA) using wet impregnation has been developed as a porous media. The prepared sorbents is characterized by N₂ physisorption technique Brunauer-Emmet-Teller analysis (BET). Significant changes in physical properties of the sorbents further ascertained the dispersion of TDA on the internal channels and external surface of the SG. Reactivity of porous sorbent towards CO₂ was evaluated using isothermal CO₂ adsorption desorption technique. This study shows 65TDA/SG enable to adsorb CO₂ in the highest capacity which is 23.22 cm³CO₂per gram sorbent. Moreover, CO₂ capture consists of two type sorption which are physisorption and chemisorption. 55TDA/SG is the best sorbent in capturing CO₂by chemisorption (19.62 cm³CO₂per gram adsorbent).

Keyword: Tetradecylamine; Modified silica gel; Carbon dioxide; Chemisorption; Physisorption