

## Molecular sieve for upgrading biogas via pressure swing adsorption to biogas green energy

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### Abstract

Besides many other problems, the world is challenged by global warming, and the target is to reduce greenhouse gas emissions. Moreover, biogas has potential as a renewable source of energy for rural areas because the majority of the rural population is agrarian, thereby generating substantial agricultural waste throughout the year. Interestingly, the biogas application at commercial scale may help in getting rid of biomass waste and reducing GHG emissions. Pressure swing adsorption has the remarkable potential to produce bio-CNG as an alternative for natural gas. A major issue faced in the majority of the upgradation plant is that an off-gas stream with a significant methane content is produced and released directly into the atmosphere, which requires to be treated further to avoid emission into the environment. Therefore, this work aims to evaluate parameters and off-gas treatment to develop an efficient model for reducing methane loss. In this study, carbon molecular sieves were employed as an adsorbent in a pressure swing adsorption for the removal and capture of CO<sub>2</sub> from biogas. Adsorption isotherms of CH<sub>4</sub> and CO<sub>2</sub> were measured experimentally meanwhile a series of breakthrough experiments were also performed on a fixed bed packed with CMS. In order to design experiments of the PSA process more reasonable, Central Composite Design Methodology was employed to implement the design of experiments, while Response Surface Methodology was used to analyse experimental results. Bio-methane with purity higher than 94.2% and recovery higher than 88% was obtained experimentally with two columns and an equalization tank.

**Key words:** Biogas, Bio-CNG, Pressure swing adsorption, Carbon dioxide



### Biography:

I am Goldy Shah pursuing PhD from Centre for rural development and technology from Indian Institute of Technology, Delhi, India. My academic background is B.Tech, M.Tech Chemical Engineering. Presently, my area of research is preparation of suitable environment friendly adsorbent for CO<sub>2</sub> capturing from biogas and designing a reactor Pressure swing adsorption for biogas upgradation. I have published 4 papers in SCI Journal Index and presented paper in more than 10-12 international conferences in India as well as Europe. I have also 3 book chapters.

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