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PII: S1385-8947(18)31628-0
DOI: https://doi.org/10.1016/j.cej.2018.08.154
Reference: CEJ 19768

To appear in: *Chemical Engineering Journal*

Received Date: 2 July 2018
Revised Date: 20 August 2018
Accepted Date: 22 August 2018

Please cite this article as: P. Brea, J.A. Delgado, V.I. Águeda, M.A. Uguina, Comparison between MOF UTSA-16 and BPL activated carbon in hydrogen purification by PSA, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.08.154

Comparison between MOF UTSA-16 and BPL activated carbon in hydrogen purification by PSA

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*Keywords: Metal-organic framework; a*ctivated carbon; PSA; simulation; H_2 purification.

HIGHLIGHTS

- Laboratory scale PSA hydrogen purification cycle experiments with two adsorbents: BPL AC and UTSA-16.
- Simulations of PSA cycles performed in the experiments with PSASIM®.
- Comparison of UTSA-16 and BPL AC with simulations of a PSA cycle for hydrogen purification.

Abstract

The aim of this work is to study the application of Metal-Organic Framework (MOF) UTSA-16 in hydrogen purification PSA processes since UTSA-16 can adsorb/desorb CO, CH_4 and specially CO_2 (typical impurities of a SMR off-gas). PSA experiments (Skarstrom type PSA cycles) for hydrogen purification from a typical SMR off-gas mixture (CH_4, CO and CO_2 as impurities) were carried out using two adsorbents: MOF UTSA-16 and BPL activated carbon (BPL AC). A simulation tool developed at the University Complutense of Madrid, PSASIM®, has been used to simulate the experimental PSA cycles. The model has been validated by reproducing the experimental results. Finally, a PSA cycle with operating conditions of hydrogen purification processes [1] has been simulated with PSASIM® with layered beds, containing UTSA-16/Zeolite 5A and BPL AC/Zeolite 5A. The results obtained from the