Different families of volatile organic compounds pollution control by microporous carbons in temperature swing adsorption processes

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Abstract
In this research work, the three different VOCs such as acetone, dichloromethane and ethyl formate (with corresponding families like ketone, halogenated-organic, ester) are recovered by using temperature swing adsorption (TSA) process. The vapors of these selected VOCs are adsorbed on a microporous activated carbon. After adsorption step, they are regenerated under the same operating conditions by hot nitrogen regeneration. In each case of regeneration, Factorial Experimental Design (FED) tool had been used to optimize the temperature, and the superficial velocity of the nitrogen for achieving maximum regeneration efficiency (Re) at an optimized operating cost (OPt). All the experimental results of adsorption step and hot nitrogen regeneration step had been validated by the simulation model PROSIM. The average error percentage between the simulation and experiment based on the mass of adsorption of dichloromethane was 3.1%. The average error percentages between the simulations and experiments based on the mass of dichloromethane regenerated by nitrogen regeneration were 4.5%.

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