عنوان مقاله:

Theoretical Study of Indirect Heating Temperature Swing Adsorption in an Adsorbent Coated Finned Tube Heat Exchanger

محل انتشار:

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خلاصه مقاله:

In this study, the performance of an adsorbent coated finned tube exchanger for carbon capture was investigated numerically. The results showed that this structure has a great potential for being applied as a medium for CO۲ capture by rapid indirect thermal swing adsorption. By using this structure, the recovery of ۹۶%, and purity of ۹۸% were achieved with a simple cycle consisting of two steps, including adsorption and regeneration. To assess the effect of operating parameters, the cooling water temperature, hot water temperature and feed flow rate were selected as varying parameters, and the recovery and purity were selected as objective functions. The results showed that by increasing the cooling water temperature from ۲۵ C to ۴۵ C the recovery decreases from ۶۵% to ۶۱% while the reduction of purity is almost negligible. The heating temperature has a more intense effect on the recovery and purity. By increasing the heating temperature form ۸۰ to ۱۲۰ the recovery increases from ۱۶% to ۶۵% and purity increases from ۹۲% to ۹۸%. The variation of feed flow rate showed that by increasing the feed from ۲ to ۶ (STP CM/min) the recovery decreases from ۹۸.۵% to ۶۵% and the purity increases from ۹۶% to ۹۸%. It should be noted that finned tube exchangers are well developed to create minor pressure drop. Thus, they are suitable structures for getting coated by adsorbent for the purpose of gas separation by Rapid Thermal Swing Adsorption.

کلمات کلیدی:

Finned tube, Coated exchanger, Rapid thermal swing adsorption, CO۲ Capture