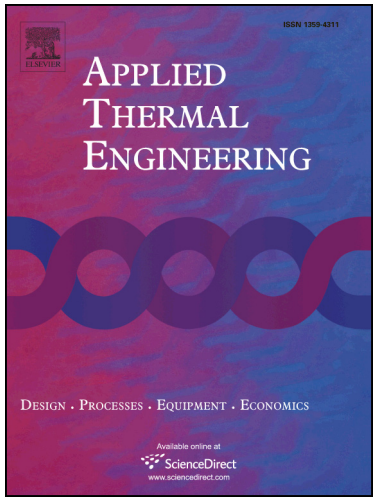

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Solar-assisted fluidized bed dryer integrated with a heat pump for mint leaves

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Abstract

A new, mixed-mode, fluidized bed drying system was developed using a solar energy system. The system was comprised of a solar air collector, a parabolic trough collector, and a heat pump system. The performance of the fluidized bed drying system was assessed by conducting energy and exergy analyses. This fluidized bed dryer was used to investigate the drying kinetics of mint leaves. The temperatures of the air used for drying by the solar energy system and the heat pump system were 45 and 50 ^{o}C, respectively. The energy and exergy efficiencies of the system were found to be 50 and 26%, respectively. The heating coefficient of performance (HCOP) was suggested as a new performance parameter of a solar energy system. The heat pump system had a coefficient of performance (COP) value of five. In other words, the heating coefficient of performance of this solar energy system was 10.

Keywords: fluidized-bed dryer; drying; energy and exergy; heating coefficient of performance (HCOP); mint

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