PERFORMANCE ANALYSIS ON SOLAR AIR DRYER USING VARIOUS PCMS AND INSULATING MATERIALS.

Abstract

This study presents a performance analysis of a solar air dryer integrated with phase change materials and insulation materials. It is very useful to maintain the maximum temperature even in low sunshine. Paraffin wax and Sodium sulfate decahydrate are used as PCM whereas polyurethane foam and wood are used as insulating materials. PCMs such as Paraffin Wax which has a maximum temperature of 57℃ and Sodium Sulphate Deca-Hydrate which has a maximum temperature of 46℃. The solar air dryer was fabricated, and tested under different time zones to evaluate its thermal performance. The experimental findings demonstrated that the solar air dryer's effectiveness was greatly increased by the incorporation of PCMs and insulating materials. With paraffin wax and sodium sulfate decahydrate, respectively, the solar air dryer's maximum temperature was raised to 45°C from the non-PCM case. Additionally, the use of insulating materials decreased heat losses and increased the solar air dryer's effectiveness. The whole investigation demonstrates that wood is the best insulating material and that paraffin wax PCM has an effectiveness of up to 98.8%.