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## Semi Continuous Solar Drying of Sludge from a Waste Water Treatment Plant

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**Abstract:** The work in this study presents a newly developed system to utilize solar energy to dewater the sludge in a semi continuous mode. The semi continuous dryer mainly consists of a moving belt on which aluminum bars are fixed to hold the sludge and a fan used to drive the air at the required speed. The effects of operating conditions, such as air velocity, belt speed, and mode of contact between the sludge and air, on the drying rate of water were investigated. The drying rate of water was measured under the effects of different operating conditions including air velocity, belt speed, and mode of contact between the sludge and air. The experimental results proved the technical feasibility of the developed solar drying system to efficiently evaporate water. The achieved drying rates were 2.02 kg water/m<sup>2</sup>. hr and 0.49 kg water/m<sup>2</sup>.hr in September and February, respectively. Under a given insolation rate a high evaporation rate is achieved at large air velocity and slow motor speed. An empirical relationship to predict the mass transfer coefficient (drying flux constant) was derived by conducting a well-designed experiment using a tray dryer. The data obtained successfully described the mass transfer coefficient expressed as  $JD=15.1Re^{-0.72}$ .