Chapter V

Conclusions and Recommendations

From this study, the main conclusion and recomendation are presented as follows.

Conclusions

This study dealing with evaporation of water from sand columns containing varying concentrations of water absorbing polymers (WAP) were designed to simulate a very simplified situation in actual was able to make the following findings.

First of all the water holding capacity of WAP containing sands was as expected found to be higher than sands without WAP. But rates of evaporation from the surface of sand columns under isothermal condition into a low humidity air stream were found to be much lower for WAP containing sands than the non-WAP containing sand. For example comparing evaporation rates from a sand column without WAP and a sand column with 0.2% of WAP into an air stream at 50 ^{O}C and 25% RH, it was found that the surface of the sand column became absolutely dry after 7 hours whereas the surface of the WAP containing sand column had a water content of about 17% after the 12

hours duration of the experiment. A study extending beyond 12 hours was difficult to undertake and that data was therefore not available although agriculture requirements would prefer a longer time frame.

The diffusion used was correlated by a dispersion coefficient in a diffusion model with the diffusion itself being a function of water content. Among the choice of 3 dispersion coefficient correlation tested among which were a linear correlation, a power correlation, and an exponential correlation it was found that the linear correlation was perhaps the best to use in that the correlation gave the best fit with experimental data and the constant of the linear correlation was "a" = 0.30 for the correlation

$$D_r = a m + (1 - a)$$

over the range of operation condition of the study .

Recomendation

Before a simulation can be attempted for periods of time longer than the 12 hours experimental time used in this study a study of the conditions at the surface of the bed needs to be done as that boundary condition will control the set of evaporation.