CH3030 Tutorial 10

1. A wet solid of 100% moisture content (dry basis) is to be dried under batch mode on a square tray of area 1 m^2 and depth 3 cm using hot air. The air is at ambient pressure and is passed over the tray in cross flow at 3 m/s velocity and is at a temperature of 160°C. Overall drying can be assumed to be exclusively due to the drying from the top surface of the tray and the surface temperature of the drying sold was determined to be 60°C. If the critical moisture content of the solid is 50% (dry basis), find the drying time assuming drying is within the constant rate period. The density of the fully dried solid is 1500 kg/m^3.
2. A wet solid exhibits the drying profile as shown below and it takes 6 hours to dry it from a initial moisture content of 40% to 10% (on a free moisture content and dry basis) in a batch drying process with the wet material placed on a tray and dried using hot air flowing across the top surface of the material. The critical and equilibrium moisture content were determined to be 12% and 5 % respectively. If the same drying conditions are applied to dry the same material from an initial free moisture content of 45% to a final moisture content of 8% (both are on dry basis), what would be the time for this drying activity?