Thapar Institute of Engineering and Technology
DEPARTMENT OF CHEMICAL ENGINEERING

Sub Code: UCH502 Sub Name: Mass Transfer-I
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Tute Sheet-10
Drying

Q1.

(Calculation of the drying time when there are two falling rates)[2] A wet solid having 32% moisture (dry basis) is to be dried on a tray dryer to a final moisture of 1%. The solid loading is 30 kg dry solid per m^2 tray area. There are two critical moisture values— $X_{c1} = 0.183$, and $X_{c2} = 0.097$. A laboratory test gives a drying rate of 4 kg/m^2·h in the constant rate period. In the first falling rate period, the drying flux is linear in the moisture content; in the second falling rate, the drying flux varies as the square of the moisture content. The equilibrium moisture is negligible. Calculate the drying time if the drying conditions are the same as in the laboratory test. Mention any assumption made.

Q2.

(Drying time calculation from experimental drying time data)[1] In the laboratory drying test of a granular, hygroscopic wet solid, it took 8.5 hours to dry the solid from 28% to 2% moisture with a solid loading of 20 kg/m^2. Given, $X_c = 0.1$, $X^* = 0.005$, and the falling rate of drying being linear in the moisture content (all moistures are on dry basis), calculate the time required for drying the material from 25% to 1.5% moisture under similar drying conditions. What are the highest and the lowest drying rates?