



ASSIGNMENT 1

All the assumptions must be clearly stated

1. Air at 131 °F and 1 atm enters a direct-heat dryer with a humidity, H of 0.01 kg H₂O / kg H₂O dry air. Determine the following from the humidity chart:
 - i) Saturation humidity
 - ii) Relative humidity
 - iii) Percentage humidity
 - iv) Humid volume
 - v) Humid heat
 - vi) Enthalpy

2. The following experimental data was obtained from surface drying of a 3.18 cm-thick X 6.6 cm² cross sectional area slab of a thick paste of CaCO₃ from both sides by air at 39.8 °C and a cross-circulation velocity of 1 m/s exhibit the complex type of drying rate curve with the following constants:

Constant rate period:

$$\begin{aligned} X_o &= 10.8\% \\ X_{c1} &= 8.3\% \\ R_{c1} &= 0.053 \text{ g H}_2\text{O /h-cm}^2 \end{aligned}$$

First falling rate period:

$$\begin{aligned} X_{c2} &= 3.7\% \\ R_{c2} &= 0.038 \text{ g H}_2\text{O /h-cm}^2 \end{aligned}$$

Second falling rate period to $X = 2.2\%$

$$R = 29.03 X^2 - 0.048 X$$

Determine the time to dry a slab of the same dimensions at the same drying conditions, but from $X_0 = 0.14$ to $X = 0.01$. Assume the initial weight of the slab is 46.4 g.