CHE 305 – Separation Processes Spring 2010 – Quiz 8

Column diameter is most commonly determined using correlated data. Correlations can be in graphical form, or in equations. Leva [*Chem. Eng. Prog. Symp. Ser.*, 50(10), 51 (1954)] developed an equation to determine the pressure drop in a packed column as a function of gas and liquid phase superficial velocities as follows:

$$\Delta P = C_2 10^{C_3 u_t} \rho_g U_t^2$$

where parameter units include: inches H₂O/ft (ΔP), lb/ft³ (ρ_g), and ft/s (u_t and U_t). The parameters u_t and U_t are the liquid and gas phase superficial velocities, respectively.

Given:

- $u_t = 0.09 \text{ ft/s}$
- $\rho_g = 0.074 \ lb/ft^3$
- 20,000 ft³/hr contaminated air stream
- Column height = 25 ft
- Column pressure drop = 10 inches H₂O
- 1 inch Berl Saddles: $C_2 = 0.40$, $C_3 = 0.0236$
- 1 inch Intalox Saddles: $C_2 = 0.31$, $C_3 = 0.0222$
- a. Determine U_t if the column is packed with 1 inch Berl saddles.

b. What is the corresponding column diameter (Berl saddles)?

c. What would be the column diameter if 1 inch Intalox saddles were used instead?