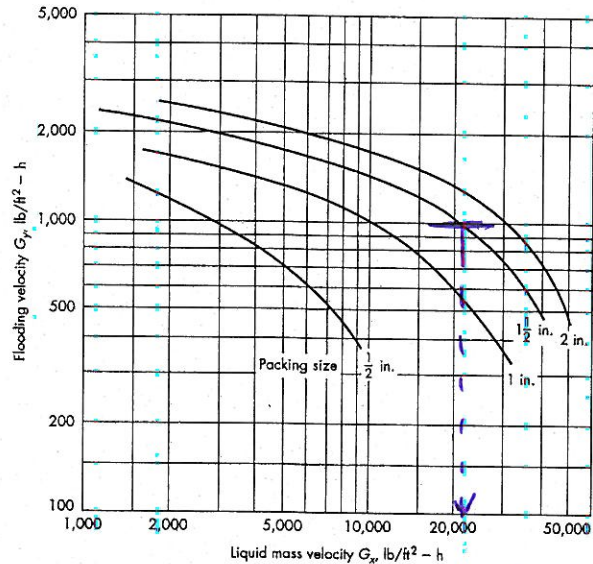
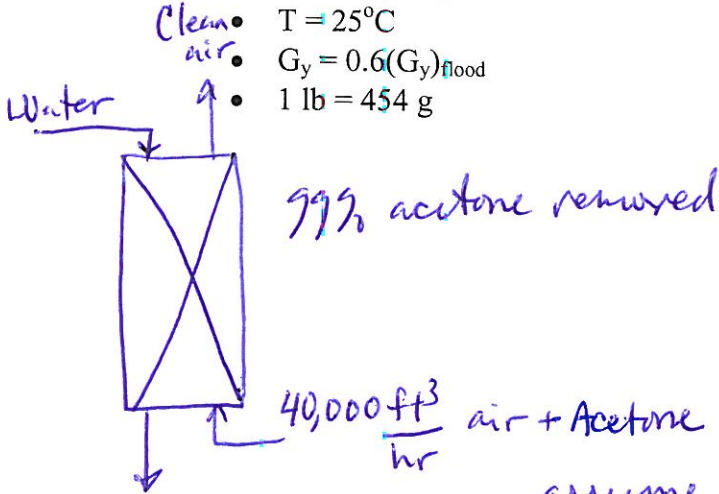


CHE 305 – Separation Processes
Spring 2010 - Exercise on Stripping Units

A 40,000 ft³/hr air stream is contaminated with 1% acetone by volume. Water is to be used for absorption of 99% of the acetone in a packed column. Use the correlated data for a column packed with 1.5 inch Intalox saddles to determine the following parameters.

Given:

- Column Diameter = 2.5 ft
- P = 1 bar
- R = 0.08314 L bar/mol K
- T = 25°C
- G_y = 0.6(G_y)_{flood}
- 1 lb = 454 g



$$\text{Area} = \frac{(2.5 \text{ ft})^2 \pi}{4} = 4.91 \text{ ft}^2$$

a. Gas phase density

assume $\rho \approx \rho_{\text{air}}$

$$\rho = (29 \frac{\text{g}}{\text{mol}}) \frac{1 \text{ bar} \cdot \text{mol} \cdot \text{K}}{0.08314 \text{ L} \cdot \text{bar}} \frac{1}{298 \text{ K}} = 1.17 \frac{\text{g}}{\text{L}}$$

b. Gas mass flow rate

$$40,000 \frac{\text{ft}^3}{\text{hr}} \left| \frac{1.17 \text{ g}}{\text{L}} \right| \left| \frac{1 \text{ lb}}{454 \text{ g}} \right| \left| \frac{1 \text{ L}}{10^3 \text{ cm}^3} \right| \left| \frac{(2.54 \text{ cm})^3}{1 \text{ in}^3} \right| \left| \frac{(12 \text{ in})^3}{1 \text{ ft}^3} \right| = 2919 \frac{\text{lb}}{\text{hr}}$$

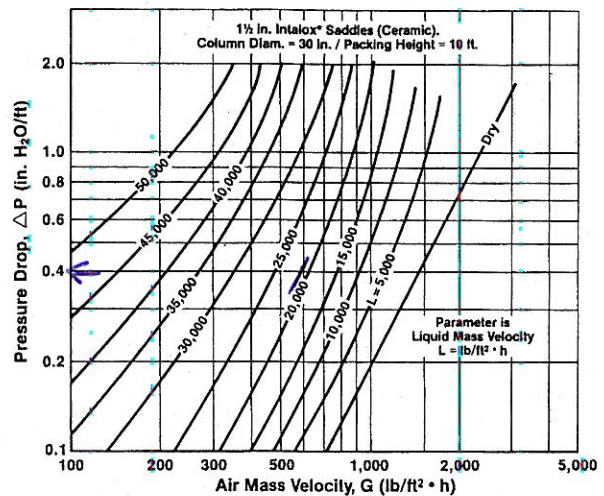
c. G_y

$$G_y = \frac{2919 \text{ lb}}{\text{hr}} \left| \frac{1}{4.91 \text{ ft}^2} \right| \approx 600 \frac{\text{lb}}{\text{ft}^2 \cdot \text{hr}}$$

$$G_{y \text{ flood}} = \frac{600}{0.6} = 1,000 \frac{\text{lb}}{\text{ft}^2 \cdot \text{hr}}$$

from plot, $G_x \approx 21,000 \frac{\text{lb}}{\text{ft}^2 \cdot \text{hr}}$

e. ΔP for a 10 ft tall column



from plot, $\Delta P = 0.4 \text{ in H}_2\text{O/ft}$

or $4 \text{ in H}_2\text{O}$ for 10 ft. column