Ex.(1) :- Absorption column receiving about 130 kmol/hr of feed gas containing 9 mole% of solute.
It is required to remove 93 % of solute using 150 kmol/hr liquid solvent.
the fed solvent has 0.4 % of solute in it.
The Murphree tray efficiency is to be 45 %
Equilibrium data are:-

x	0.013	0.033	0.049	0.064	0.074	0.093	0.106
y	0.01	0.026	0.043	0.06	0.073	0.1	0.126

Determine the No. of trays required?

Sol.:-

$x_T = 0.004$

$y_T = ?$

$y_B = 0.09$

$x_B = ?$

To remove 93% from 9% initial

$y_T = 0.09 (1 - 0.93)$

$y_T = 0.0063$

To find x_B make overall M.B

$$G(y_B - y_T) = L(x_B - x_T)$$

$$130(0.09 - 0.0063) = 150(x_B - 0.004)$$

$$10.881 = 150(x_B - 0.004)$$

$$x_B = 0.07654$$

To find operating line equation
Make M.B between Top of Column and any section.

$$G(y - y_T) = L(x - x_T)$$
$$130(y - 0.0063) = 150(x - 0.004)$$

$$\boxed{y = 1.15x - 0.0017}$$ operating line equation.

Plot equilib^m line :-

between :-

$$(0.004, 0.0063) \quad , (0.0765, 0.09)$$

From the Fig. :-

No. of theo. trays = 8

No. of Actual trays $= \frac{8}{0.45} = 18$