E-operator

$$Y_{n+1} = E\ Y_n$$

$$Y_{n+2} = E^2\ Y_n$$

$$Y_{n-1} = E^{-1}\ Y_n$$

$$Y_{n-2} = E^{-2}\ Y_n$$

$$\boxed{Y_n = c_1\ \rho_1^{\,n} + c_2\ \rho_2^{\,n}}$$

Where:

ρ_1 , ρ_2 : are roots of equation.

Y_n : is the concentration (mole ratio) of solute on tray (n).

n : is the number of trays.

c_1 , c_2: are equation constants.

To find the equation constants we will use the boundary conditions at:

n = 0

n = 1 Then we will have two equations, we can solve them simultaneously to find c_1 and c_2.

2. Tray or plate tower:

The plate column is a common type of absorption equipment for large installations. Bubble-cap columns or sieve trays are sometimes used for gas absorption, particularly when the load is more than can be handled in a packed tower of about 1 m diameter and when there is any probability of deposition of solids which would quickly choke a packing. Plate towers are particularly useful when the liquid rate is sufficient to flood a packed tower. Phase equilibrium is assumed to be achieved at each tray between the vapor and liquid streams leaving the tray. That is, each tray is treated as equilibrium stage. Assume that the only component transferred from one phase to the other is solute A.

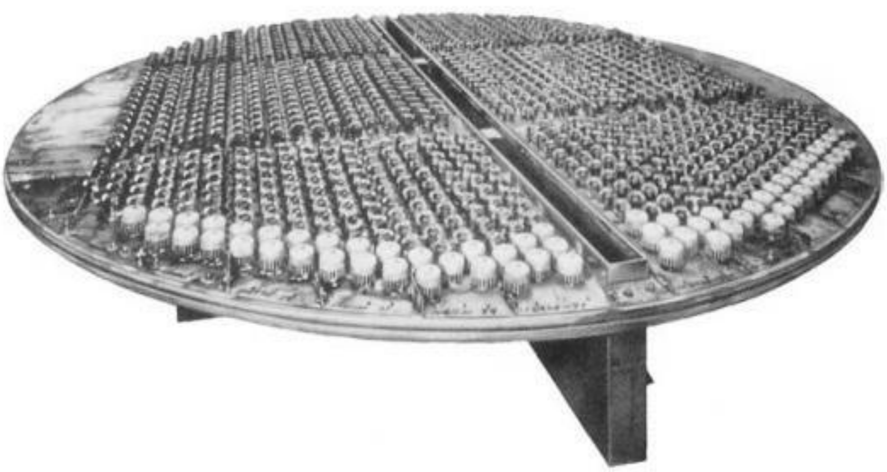

Figure 11.51: Bubble-cap tray.

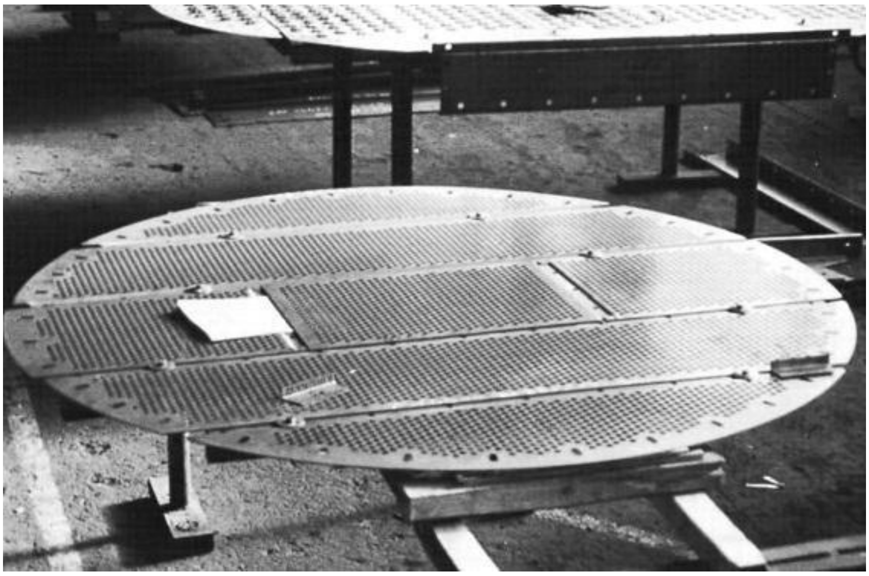

Figure 11.52: A perforated or sieve tray.

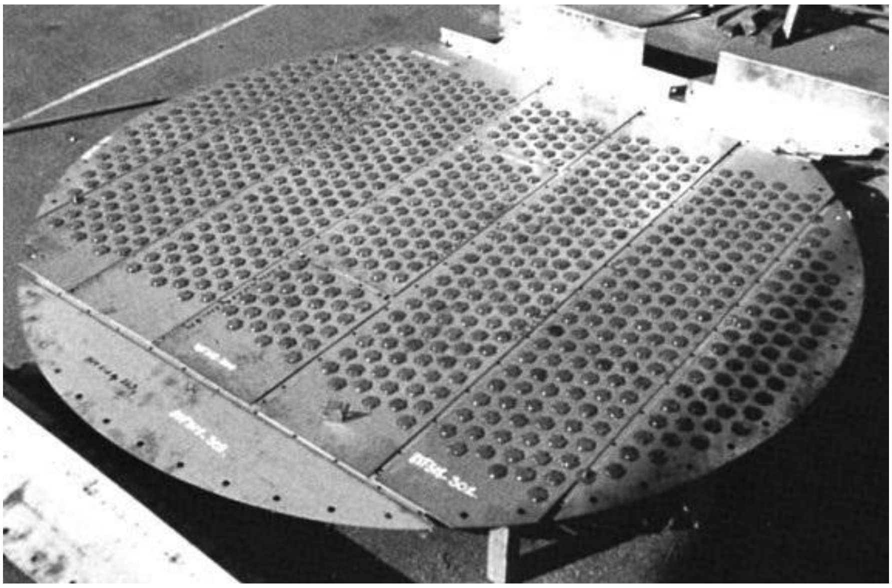

Figure 11.53: A bubble tray.

The height of tray tower can be obtained by using the following equation:

Z = H * N

Where:

H : is the distance between two trays, and it is given (0.3 - 0.7 m) and usually used (0.5 m).

N : is the number of trays, and it can be calculated based on equilibrium data.