# Batch distillation

[Science](), [Chemistry]()

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For this same section, $V_i = D + L_{i-1}$

$y_iV_i = x_0D + x_{i-1}L_{i-1}$

The operating line represents the combined mass and energy balances, as they occur in the rectifying section of the column. The above equations are applicable only when i = 1, 2, 3,..., n, and more specifically, when i = 1 gives

$y_1 = x_o = x_D$

Tray efficiency, η =

Rectifying section:

T1

T2

T3

T4

x-axis

0. 8

0. 77

0. 72

0. 69

y-axis

0. 78

0. 68

0. 66

0. 67

Stripping section:

T1

T2

T3

T4

x-axis

0. 23

0. 35

0. 46

0. 58

y-axis

0. 38

0. 46

0. 54

0. 66

The above is a sketch indicating the expected graph.

The trays offer equilibrating surfaces, allowing for the vapor and liquid phases of the components of the mixture to equilibrate. The feed line is also used in this process. When the feed is introduced at the fourth stage, it coincides with the operating lines. In the event that this does not happen, it becomes evident that the liquid being used as a feed is not saturated. This experiment exemplifies this scenario. In such a case, the McCabe-Thiele diagram becomes a simple line graph.

The McCabe-Thiele diagram is usually used in calculating the number of states that have been used in the procedure. This is usually necessary when the efficiency of the system needs to be improved. Liquid concentration samples taken at the end of the distillation period are used to work out various other functions that will be required for subsequent calculations. This process normally goes on until such a time that the compositions of obtained samples do not show any changes. This point is known as the steady-state, and it is useful in the analysis of how efficient the distillation has been. Near-pure samples are obtained by this process.