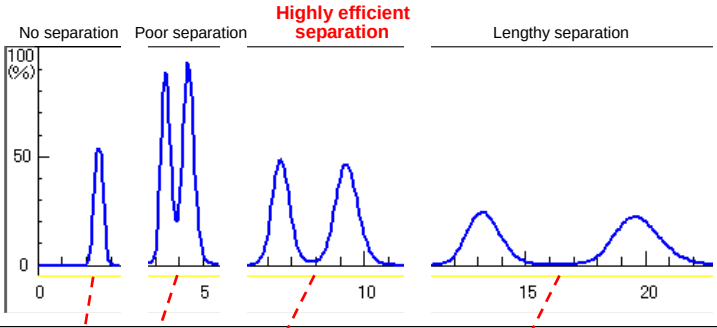
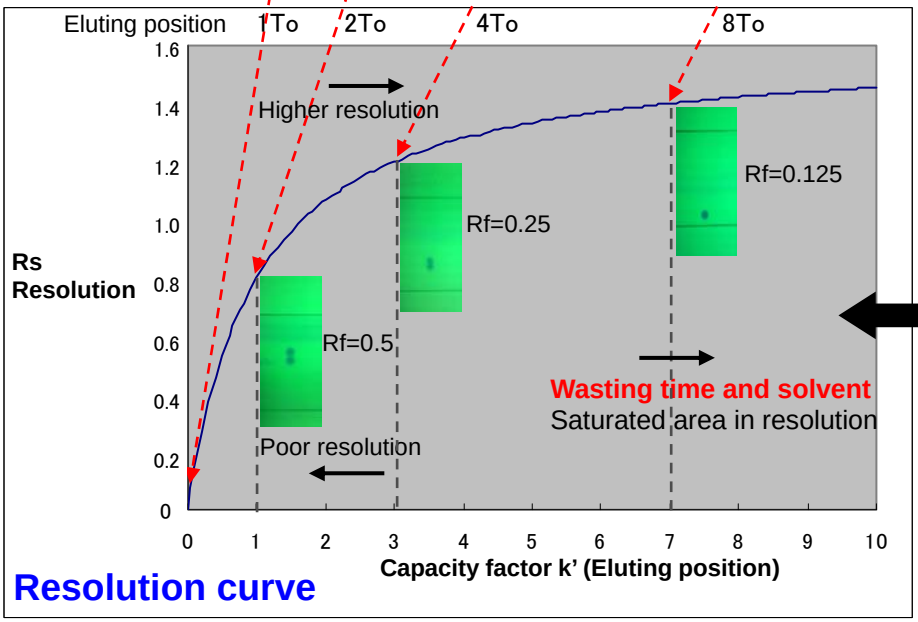
– RESOLUTION AND RETENTION TIME–

Elute a Target Compound at the Best Position

Resolution varies depending on the eluting position of the target compound.



Sample:
Butyl p-hydroxybenzoate
Methyl p-hydroxybenzoate



Resolution curve

Vo = 1 column volume (1 CV)
V = Solvent consumption
$\mathcal{V}$ = Flow rate (ml/min.)
Rf = Relative to the front
N = Theoretical plate number of a column

α (Separation factor) = $\frac{k2'}{k1'}$

Note: The α is the separation factor of 2 compounds. And it varies with the characteristic of the column material (adsorbent).

To = $\frac{Vo}{\mathcal{V}}$ (Time required for solvent to run through a column)

k' (Capacity factor) = $\frac{V}{Vo} - 1$

Note: k' is an index of the retention.

Mathematical formula of Resolution (Rs):

$$Rs = \frac{\sqrt{N}}{4} \cdot \frac{\alpha - 1}{\alpha} \cdot \frac{K'}{1 + K'}$$

This mathematical formula tells that resolution (Rs) varies with k' (capacity factor) if the column packing material and the solvents are fixed. The above graphic shows each Chromatographic profile which corresponds to k' = 0, k' = 1, k' = 3 and k' = 7 respectively. This k' correlates with the TLC Rf value (k' = 1/Rf – 1). Therefore, resolution (Rs) is given by the Rf value of the target compound. Simply input the TLC Rf value of the target compound only, with the related mixture ratio of solvents, and Yamazen software will automatically set up the optimum gradient method for the sample run. No need to input 2 different Rf values – 1 for the target and 1 for the impurity. No need to run TLC twice with 2 different solvent mixtures. Yamazen systems always elute the target compound at around k' = 3 (or 4 CV or 4 To) regardless of the column size and the flow rate to minimize the run time, save energy and solvents, to assure good sample separations. (Japanese Patents 3423707, 4087395, US Patent 7169308)

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