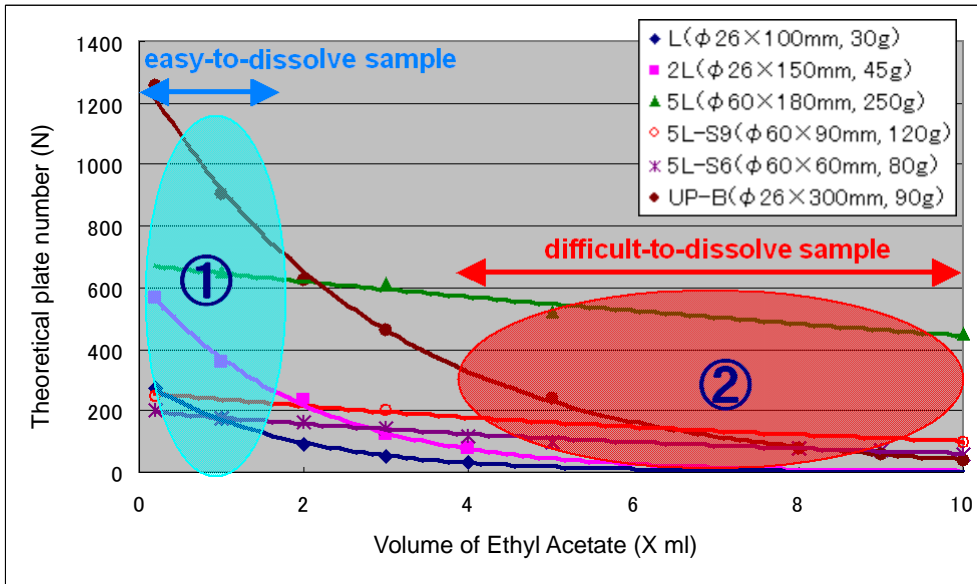# Appropriate Column Selection for Samples dissolved in Polar Solvents

## (I) Shape of Column and Column Performance

It is advisable to use solvents to dissolve the sample that is the same as or similar to the mobile phase, when doing a preparative chromatography. However, there are many samples that can be dissolved only by high polar solvents. High polar solvent used to dissolve the sample could often result in poor chromatography. Also, the shape of the column could vary the end result.

Easy-to-dissolve sample / difficult-to-dissolve sample graph. Theoretical plate number (N) vs Volume of Ethyl Acetate (X ml).

Legend:
- L (φ26×100mm, 30g)
- 2L (φ26×150mm, 45g)
- 5L (φ60×180mm, 250g)
- 5L-S9 (φ60×90mm, 120g)
- 5L-S6 (φ60×60mm, 80g)
- UP-B (φ26×300mm, 90g)

[Area① in the diagram on left]
Sample dissolved in solvent containing no or a little polar solvent or an easy-to-dissolve sample: Column performance (or theoretical plate number) is in direct proportion to the column length.
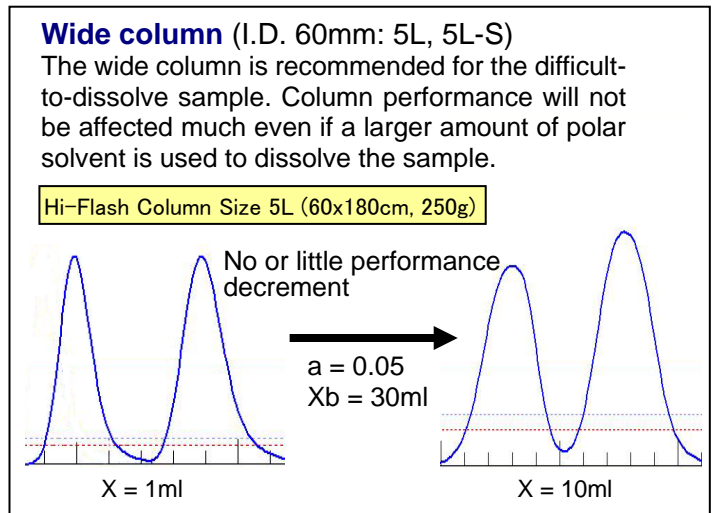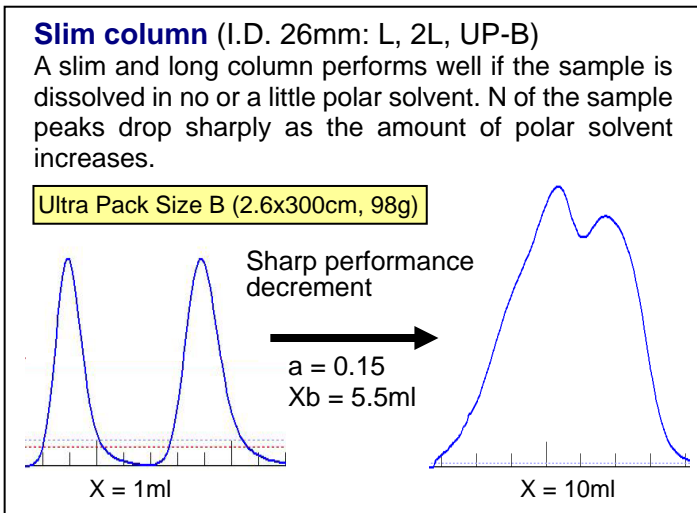
Hi-Flash, Size L

Length: 10cm
N = 300

Ultra Pack, Size B
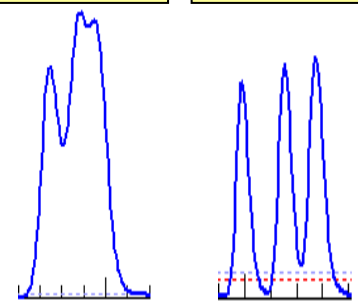
Length: 30cm
N = 1000

(N: Theoretical plate number)

[Area② in the diagram above] Sample dissolved in polar solvent or a difficult-to-dissolve sample:

N of the column decreases as an amount of polar solvent increases. Its ratio "a" varies with the column inner diameter. Two chromatograms below require 200 or larger N to make good sample separations. Amount of ethyl acetate used to dissolve the sample: X (ml), Amount of ethyl acetate that makes N smaller than 200: Xb (ml)

Slim column (I.D. 26mm: L, 2L, UP-B)
A slim and long column performs well if the sample is dissolved in no or a little polar solvent. N of the sample peaks drop sharply as the amount of polar solvent increases.

Ultra Pack Size B (2.6x300cm, 98g)

Sharp performance decrement

a = 0.15
Xb = 5.5ml

X = 1ml → X = 10ml

Wide column (I.D. 60mm: 5L, 5L-S)
The wide column is recommended for the difficult-to-dissolve sample. Column performance will not be affected much even if a larger amount of polar solvent is used to dissolve the sample.

Hi−Flash Column Size 5L (60x180cm, 250g)

No or little performance decrement

a = 0.05
Xb = 30ml

X = 1ml → X = 10ml

(II) Shape of Column and Performance

Slim and long column

- Column performance is greatly affected by polar solvent. (Large "a")
- Works well for the easy-to-dissolve sample.

Wide column

- Minimize the effects of polar solvent. (Small "a")
- Performs well for the difficult-to-dissolve sample.