

CHOOSING THE APPROPRIATE STATIONARY PHASE IN SFC

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Abstract

When facing a new separation problem, the choice of the appropriate stationary and mobile phases in SFC generally depends on the chromatographer's experience. Thus, trial-and-error procedures can be time-consuming.

Among chromatographic characterization methods, the Linear Solvation Energy Relationship (LSER) allows to determine the share of the varied types of interactions involved in the retention process. The injection of a set of test solutes with known properties is required to calculate the coefficients or system constants of the model, each of them being associated to a precise type of interaction: charge transfer, dipole-dipole, acido-basic and dispersion. The coefficient values reflect the importance of each type of interaction in a particular chromatographic system.

We studied numerous types of stationary phases, ranging from the most polar silica and cyanopropyl bonded silica, to the less polar alkyl bonded silica. Less common stationary phases were also included, such as porous graphitic carbon (PGC), fluorinated phases, polymeric phases, polar embedded alkyl phases and varied types of aromatic bonded silica.

The interactions occurring with each stationary phase, that is to say, the potential selectivity of each chromatographic system, greatly vary, depending on the type of bonding. We observe that:

- Very different types of bonding can lead to similar selectivities.
- A small difference in the bonding type can induce great changes in selectivity.

Furthermore, we developed a method for the comparison of chromatographic systems allowing to suggest a stationary phase classification, from silica to ODS, based on differences in selectivity and in retention.

Thus, this characterization method can be used to select the chromatographic stationary phases when developing new analytical methods. To evidence its predictive capability when facing a particular separation problem, an application is presented.

