

selectivity coefficient, $k_{A/B}$ *in ion exchange chromatography*

The equilibrium coefficient obtained by application of the law of mass action to ion exchange and characterizing quantitatively the ability of an ion exchanger to select one of two ions present in the same solution. The ions involved in the exchange should be specified as subscripts. Examples: Exchange: $\text{Mg}^{2+} - \text{Ca}^{2+}$

$$k_{\text{Mg}/\text{Ca}} = \frac{[\text{Mg}]_{\text{S}} / [\text{Ca}]_{\text{S}}}{[\text{Mg}]_{\text{M}} / [\text{Ca}]_{\text{M}}}$$

Exchange: $\text{SO}_4^{2-} - \text{Cl}^-$

$$k_{\text{SO}_4/\text{Cl}} = \frac{[\text{SO}_4]_{\text{S}} / [\text{Cl}]_{\text{S}}^2}{[\text{SO}_4]_{\text{M}} / [\text{Cl}]_{\text{M}}^2}$$

In the above equations subscript S refers to the ion exchanger ('stationary phase') and M to the external solution ('mobile phase'). For exchanges involving counter-ions differing in their charges, the numerical value of $k_{A/B}$ depends on the choice of the concentration scales in the ion exchanger and the external solution (molal scale, molar scale, mole fraction scale, etc.). Concentration units must be clearly stated for an exchange of ions of differing charges. The corrected selectivity coefficient ($k_{A/B}^a$) is calculated in a way identical to the selectivity coefficient except that the concentrations in the external solutions are replaced by activities. This term should not be used as a synonym for separation factor.

Source:

PAC, 1993, 65, 819 (*Nomenclature for chromatography (IUPAC Recommendations 1993)*) on page 857

PAC, 1993, 65, 2373 (*Nomenclature for liquid-liquid distribution (solvent extraction) (IUPAC Recommendations 1993)*) on page 2385