

is centrifuged to break the formed emulsion and the extracting solvent is manually separated. The organic solvents commonly used in DLLME are halogenated hydrocarbons that are highly toxic. These solvents are heavier than water, so they sink to the bottom of the centrifugation tube which makes the separation step difficult. By using solvents of low density, the organic extractant floats on the sample surface. If the selected solvent such as undecanol has a freezing point in the range 10–25°C, the floating droplet can be solidified using a simple ice-bath, and then transferred out of the sample matrix; this step is known as solidification of floating organic droplet (SFOD). Coupling DLLME to SFOD combines the advantages of both approaches together. The DLLME-SFOD process is controlled by the same variables of conventional liquid–liquid extraction. The organic solvents used as extractants in DLLME-SFOD must be immiscible with water, of lower density, low volatility, high partition coefficient and low melting and freezing points. The extraction efficiency of DLLME-SFOD is affected by types and volumes of organic extractant and disperser, salt addition, pH, temperature, stirring rate and extraction time. This review discusses the principle, optimization variables, advantages and disadvantages and some selected applications of DLLME-SFOD in water, food and biomedical analysis.

Mazak, K. and B. Noszal (2014). “Drug delivery: A process governed by species-specific lipophilicities.” *Eur J Pharm Sci* 62:96–104.

Drug delivery is a cascade of molecular migration processes, in which the active principle dissolves in and partitions between several biological media of various hydrophilic and lipophilic character. Membrane penetration and other partitions are controlled by a number of physicochemical parameters, the eminent ones are species-specific basicity and lipophilicity. Latter is a molecular property of immense importance in pharmacy, bio-, and medicinal chemistry, expressing the affinity of the molecule for a lipophilic environment. This review gives an overview of the types and definitions of the partition coefficient, the most widespread lipophilicity parameter, focusing on the species-specific (microscopic) partition coefficients. We survey the pertinent literature and summarize our recent works that enabled the determination of previously inaccessible species-specific partition coefficients for coexisting, inseparable protonation isomers too. This thorough insight provides explanation why some drugs unexpectedly get into the CNS and sheds some light on the submolecular mechanism of pharmacokinetic processes. The contribution of the various ionic forms to the overall partition can now be quantitated. As a result, there is clear-cut evidence that passive diffusion into lipophilic media is not necessarily predominated by the noncharged species, contrary to the widespread misbelief.

Mazak, K. and B. Noszal (2016). “Advances in microspeciation of drugs and biomolecules: Species-specific concentrations, acid–base properties and related parameters.” *J Pharm Biomed Anal* 130:390–403.

The pharmacokinetic and pharmacodynamic behavior of drugs and the interacting biomolecules are highly influenced by their species-specific physicochemical properties. The first of such biorelevant, structure-dependent properties were the species-specific acid–base constants and the codependent concentrations, but the past decade brought significant advances to previously uncharted territories, including the experimental determination of species-specific partition coefficients, solubilities and redox equilibrium constants. This review gives an overview of the types and definitions of