Technical Note

Understanding Sample Preparation Terminology

Applications Department; SCION Instruments, May 2024

Understanding the terminology associated with sample preparation is important in order to understand your application. This technical note aims to provide clarity on some of the most commonly used terms within the industry.

Additive

A substance which is added to the mobile phase in order to increase separation and/or detection capabilities.

Buffer

A buffer is a solution that maintains a constant pH – it resists changes in pH when diluted or when small amounts of acid or base are added. See our website for our guide on buffers and mobile phases.

Centrifugation

Centrifugation is the process of separating two immiscible liquids by centrifugal force.

Concentration

The amount of a substance, typically dissolved in a solution

Conditioning

In solid phase extraction (SPE) conditioning is usually the first step, it involves removing any impurities that may have been left behind during the manufacturing process. Conditioning also has the benefit of activating the sorbent which promotes interaction with the analyte. See our website for our guide on SPE for more information.

Derivatization

Derivatization is a sample preparation technique where the analyte is converted into a product which has a similar chemical structure to the original analyte but with increased detection capabilities. See our website for more information on derivatization.

Dilution

Reducing the concentration of a sample by adding a solvent.

Dispersive Solid Phase Extraction

Loose sorbent material is added directly to the sample rather than the sample being passed through a cartridge or tube with the packed material at the bottom.

Dissolution

Dissolving a sample in the appropriate solvent.

Distillation

The separation of mixtures based on differences in their boiling points.

Elution step

In SPE the elution step is the stage in the extraction where analytes of interest are removed from the SPE stationary phase – this is usually done with a strong solvent. See our guide on solid phase extraction for more information.

Emulsion

An emulsion is a mixture of at least two liquids that are usually immiscible. However, in an emulsion one liquid is dispersed into the other.

Enantiomeric compound

Enantiomeric compounds are compounds which display chiral activity.

Evaporation

Evaporation is the process of removing a volatile compound. Solvent evaporation is often used as a sample preparation technique and aims to concentrate the sample.

Extraction

Removing the analyte of interest from its matrix.

Filtration

Often involves passing a liquid through paper, membrane, glass or any other type of filter. Filtration aims to remove particulates from the sample.

Homogenisation

Making a sample more uniform by blending or mixing.

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Ligand

A ligand is an ion or molecule which binds to a metal by coordinate bonding. In biochemistry a ligand is a molecule which binds to another, usually larger molecule.

Liquid-liquid extraction

Liquid-liquid Extraction (LLE) is the exchange of compounds between two immiscible solvents. Typically, LLE is performed using an aqueous phase, such as water and an organic phase. See our guide on liquid-liquid extraction for more information.

Loading (SPE)

The process of loading a sample on to the SPE stationary phase.

Positive Pressure Manifold

Designed for SPE, they use positive pressure to push liquid samples through SPE sorbent beds.

Protein Precipitation

Also known as Protein Crashing. Proteins are either removed or reduced in a biological fluid sample. Organic solvents such as acetonitrile are added to the fluid, proteins are insoluble and therefore precipitate (crash) out of solution. The sample is usually then either centrifuged or filtered to removed the precipitate.

QuEChERS

The QuEChERS technique consists of two steps, the first is salting out which uses either a buffered or unbuffered solvent. The second step is dispersive SPE which is designed to remove interferences and matrix compounds.

Serial Dilution

A technique used to prepare calibration standards. A step-wise series of dilutions where the dilution factor remains the same for each step.

Silylation

Silylation is the replacement of an acidic hydrogen with an alkylsilyl group. This replacement with an alkylsilyl group yields compounds that are less polar, more volatile and have greater thermal stability.

Solid Phase Extraction

Solid phase extraction (SPE) is a technique that is used to clean up and concentrate samples prior to analysis by GC or high performance liquid chromatography (HPLC).

This often involves the use of SPE cartridges containing a chromatographic sorbent bed, the analytes will remain on the sorbent bed and the sample matrix liquid will pass through the column. The sorbent is washed to remove any unwanted interferences, an elution solvent is then used to elute the analytes from the column. See our guide on solid phase extraction for more information.

Sonication

Sonication uses sound energy to agitate particles in a sample.

Ultrasonication

The use of ultrasound to agitate particles in a sample.

Vacuum Filtration

Uses vacuum to pull liquids through a filter.

Vacuum Manifold

A type of manifold that has been specially designed for SPE cartridges and disks, it uses vacuum to help pull liquids through the sorbent bed.

Wash Step

In SPE the wash step comes after loading the sample. The wash step removes contaminants and cleans up the sample. The properties of a wash solvent are that is has a stronger elution strength than the sample solvent, but a weaker elution strength than the elution solvent. This ensures that the analyte is not eluted but the impurities/unwanted contaminants are.

Zwitterions

Zwitterions are a type of ion that carries both positive and negative charge in solution.

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