Solid Phase Extraction and its different phases by David_johnson

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Solid phase extraction can be used to isolate analyses of interest from a wide variety of matrices, including urine, blood, water, beverages, soil, and animal tissue. SPE uses the affinity of solutes dissolved or suspended in a liquid for a solid through which the sample is passed to separate a mixture into desired and undesired components. The result is that either the desired analyses of interest or undesired impurities in the sample are retained on the stationary phase. The portion that passes through the stationary phase is collected or discarded, depending on whether it contains the desired analyses or undesired impurities. If the portion retained on the stationary phase includes the desired analyses, they can then be removed from the stationary phase for collection in an additional step, in which the stationary phase is rinsed with an appropriate element.

Solid phase extraction cartridges and disks are available with a variety of stationary phases, each of which can separate analyses according to different chemical properties. Most stationary phases are based on silica that has been bonded to a specific functional group. Some of these functional groups include hydrocarbon chains of variable length, quaternary ammonium or amino groups, and sulfuric acid or carboxyl groups.

Following are the different types of solid phase extractions.

1. Normal Phase SPE procedure:

A typical solid phase extraction involves four basic steps. First, the cartridge is equilibrated with a non-polar solvent or slightly polar, which wets the surface and penetrates the bonded phase. Then water, or buffer of the same composition as the sample, is typically washed through the column to wet the silica surface. The sample is then added to the cartridge. As the sample passes through the stationary phase, the analyses in the sample will interact and retain on the sorbent while the solvent, salts, and other impurities pass through the cartridge. After the sample is loaded, the cartridge is washed with buffer or solvent to remove further impurities. Then, the analyze is eluted with a non-polar solvent or a buffer of the appropriate pH

2. Reversed phase SPE:

Reversed phase SPE separates analytes based on their polarity. The stationary phase of a reversed phase SPE cartridge is derivatized with hydrocarbon chains, which retain compounds of mid to low polarity due to the hydrophobic effect. The analyte can be eluted by washing the cartridge with a non-polar solvent, which disrupts the interaction of the analyte and the stationary phase.

3. Ion exchange SPE:

Ion exchange sorbents separate analyses based on electrostatic interactions between the analyst of interest and the positively charged groups on the stationary phase. For ion exchange to occur, both the stationary phase and sample must be at a pH where both are charged.

3.1 Anion exchange:

Anion exchange sorbents are derivatized with positively charged functional groups that interact and retain negatively charged anions, such as acids. Strong anion exchange sorbents contain quaternary ammonium groups that have a permanent positive charge in aqueous solutions, and

weak anion exchange sorbents use amine groups which are charged when the pH is below about 9.

3.2Cation Exchange:

Cation exchange sorbents are derivatized with functional groups that interact and retain positively charged cations, such as bases. Strong cation exchange sorbents contain aliphatic sulfonic acid groups that are always negatively charged in aqueous solution, and weak cation exchange sorbents contain aliphatic carboxylic acids, which are charged when the pH is above about 5.

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Supra Sciences is one of the a Solid phase extraction Company who has experience in the Silicon Valley at USA. Supra Sciences has good work at a Thiophenol and Thio Silica.

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