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WELCH MATERIALS, INC.

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SPE
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WELCHROM® INTRODUCTION OF SPE TECHNOLOGY

Overview

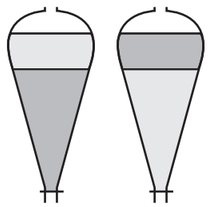
Solid Phase Extraction (SPE) is a widely used and increasingly popular sample preparation technique. It is mostly used to process liquid samples, extracting, concentrating, and purifying semi-volatile and non-volatile compounds, though it can also be applied to solid samples, which need to be converted into liquids first. At present, SPE is primarily used in the field of food safety, such as for the analysis of antibiotic and antimicrobial residues in various food products, pesticide residue analysis in agricultural products, and the detection of legal and illegal additives in foods. In the pharmaceutical research field, SPE is widely applied in drug metabolism and pharmacokinetics studies, as well as in the analysis of traditional Chinese medicine. In environmental protection, it is used to analyze polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), various pesticides, and organic substances in drinking water, groundwater, and wastewater.

Principle of SPE

Solid Phase Extraction (SPE) is a sample preparation technique that started developing in the mid-1980s. It evolved from liquid-solid extraction and liquid chromatography technologies. The main principle is based on the selective adsorption and desorption of sample components by solid-phase packing materials, achieving separation, purification, and enrichment of the sample. The primary goal is to reduce matrix interference and improve detection sensitivity. When complex sample solutions pass through the adsorbent, the adsorbent selectively retains target compounds and a small number of interfering substances with similar properties through polar interactions, non-polar interactions, or ion exchange. Other components flow through the column. The target compound is then eluted with a stronger solvent system, achieving separation, purification, and enrichment of complex samples. The mechanism of SPE is the same as liquid chromatography; however, due to the special selection of the solvent system in SPE, there are some differences in separation efficiency between the two methods.

1. Advantages of SPE Compared to Traditional Liquid-liquid Extraction

- Higher sample throughput: SPE allows for processing more samples within the same amount of time.
- Better purification: SPE provides effective purification without emulsification issues.
- Enrichment of analytes: It enables the concentration of analytes, improving recovery rates and reproducibility.
- Solvent savings: SPE uses less solvent, making it safer for both the environment and operators.
- Easy automation: SPE is easier to automate compared to traditional LLE.



Liquid-liquid Extration



SPE

2. Effect of SPE

Specifically, technology serves the following three purposes

Enrichment: In trace analysis or preparation, enriching the target compounds is a necessary process. For example, when analyzing PAHs in water, 1000 mL of a water sample can be passed through an SPE column, where the PAHs are retained, and then eluted with a small amount of solvent (such as 2 mL). This results in a 500-fold concentration of PAHs, meaning that under the same detection conditions, the method detection limit of the analyte is only 1/500 of what it was before treatment.

Purification: This step removes interfering substances prior to instrumental analysis. On one hand, it prevents interference with the target compounds, improving analytical sensitivity; on the other hand, it protects the instrument from damage caused by impurities.

Solvents for conversion: Solvent Exchange: Some analytical instruments have specific requirements for the sample solution's solvent. SPE columns can be used for solvent exchange. For example, when analyzing semi-volatile pollutants in water by GC, directly injecting water can affect separation and damage the gas chromatography column. Therefore, a solvent exchange is needed. The water sample is passed through a reverse-phase extraction column, where the target compounds are retained and separated from the water. The compounds are then eluted with a volatile organic solvent that dissolves the target compounds well. After drying and concentrating, the sample can be analyzed.

3. Composition of SPE Columns

Common SPE columns consist of three parts: the column tube, frits, and adsorbent.

Column tube: This is the support for the adsorbent, typically made of polypropylene and usually shaped like a syringe. Welch also provides glass column tubes for special analyses (such as PAES analysis). The outlet size at the bottom of the column is standardized to be compatible with SPE manifolds and instruments from various manufacturers.

Frit: These fix the adsorbent in place and filter the solution. Polyethylene is the most common material for frits, but for special analyses, materials such as PTFE, stainless steel, or glass can also be used.

Adsorbent: The core component that performs the separation in SPE columns. Adsorbents like Florisil and graphitized carbon black, which were widely used in early column chromatography, are still employed in SPE. Currently, the most common adsorbents are silica-bonded ones, made by bonding various functional groups to silica particles. In recent years, organic polymer adsorbents, such as polydivinylbenzene-N-vinylpyrrolidone, have been developed. These adsorbents are increasingly replacing silica-bonded ones in many applications due to their excellent reproducibility, wide pH range, and broad applicability.

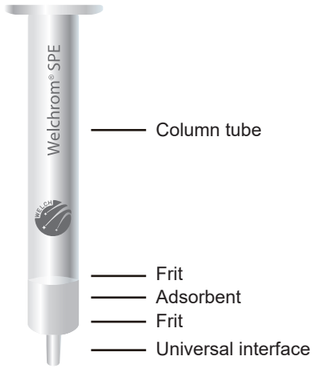
Supporting equipment:

SPE Manifold: used to support SPE column, provide pressure and collect waste liquid, etc.

Large capacity injector: Increases the container volume above the column, allowing for a larger sample volume in a single run.

Adapter: Connect the column to other columns or to sample reservoirs, facilitating easier sample loading.





4. Common Terms and Interactions in Solid Phase Extraction (SPE)

Target compound: The compound intended to be separated from a complex sample matrix.

Matrix: The environment in which the target compound resides, typically containing many interfering substances.

Interfering substances: Compounds that affect the analysis of the target compound or could cause damage to analytical instruments, usually referring to all compounds in the matrix except for the target compound.

Adsorbent: The packing material in a solid-phase extraction (SPE) column that selectively extracts certain compounds from a sample solution.

Adsorption capacity: The total mass of compounds (including target compounds and some interfering substances) that a given mass of adsorbent can retain under specific conditions.

Selectivity: The ability of the adsorbent to differentiate between the target compound and all other sample components. High selectivity results in better purification by retaining the target compound while excluding other components.

pH: The negative logarithm of the proton (H^+) concentration in a solution, with smaller values indicating a higher proton concentration.

pKa: The negative logarithm of the acid dissociation constant (Ka). A smaller pKa indicates stronger dissociation of acidic compounds. When the pH of the sample solution equals the pKa, the concentrations of the undissociated and dissociated forms of the compound are equal. For basic compounds, pKa refers to the dissociation constant of the conjugate acid, with larger values indicating a stronger ability to bind protons and stronger basicity.

Interaction: The forces of attraction or repulsion between two chemical substances (e.g., between the target compound and the adsorbent, or between the target compound and solvent molecules) in a specific chemical environment.

Non-polar interaction: The interaction between non-polar functional groups on the target compound and the non-polar adsorbent. This interaction is most effectively demonstrated in polar solvent environments, particularly in water, hence it is also known as hydrophobic interaction. For example, in a water environment, the interaction between phthalates and C18 is a typical non-polar interaction.

Polar interaction: The interaction between polar functional groups on the target compound and polar functional groups on the adsorbent. This interaction is most effectively observed in weakly polar or non-polar solvent environments.

Ion interaction: Coulombic forces between ionized functional groups on the target compound and oppositely charged functional groups on the adsorbent.

Secondary interactions: For reversed-phase silica-bonded adsorbents, residual silanol groups on the surface can interact with polar compounds via polar interactions, and dissociated silanol groups can engage in ionic interactions with basic compounds. These interactions are secondary to non-polar interactions and are often undesirable for reversed-phase silica adsorbents. End-capping techniques are typically used to eliminate these secondary interactions.

Activation: Also known as solvation, this process involves introducing a suitable solvent to expose the functional groups on the adsorbent and remove any potential contaminants. For reversed-phase adsorbents, moderately polar solvents (e.g., methanol) are commonly used, while for normal-phase adsorbents, weakly polar or non-polar solvents (e.g., hexane) are preferred.

Equilibrium: After activation, a suitable solvent environment is created for sample application by removing the activation solvent. The equilibration solvent is usually the same as the sample solvent. For ion exchange columns, acids are often added to the equilibrating solution if the sample contains basic compounds, while bases are added for acidic compounds.

Retention: When the sample solution passes through the adsorbent, compounds are retained if the interaction between the adsorbent and the compounds is stronger than that between the compounds and the solvent.

Washing: After sample loading, both interfering substances and the target compound may be retained. A suitable wash solution is introduced to remove as much of the interfering substances as possible without affecting the retention of the target compound. A sample solvent with similar strength to the loading solvent typically does not impact recovery, but a stronger solvent wash can more effectively remove interfering substances. When selecting a washing solution, it is essential to balance recovery rate and purification efficiency.

Penetration: This occurs when the retention capacity of the adsorbent is insufficient or when the mass of the compound exceeds the adsorbent's capacity, resulting in partial or total target compound elution during sample application. This phenomenon is considered an operational error and should be avoided.

5. Interactions in Solid Phase Extraction(SPE)

In the solid phase extraction process, the retention and elution of compounds on the adsorbent are controlled by the interactions between the adsorbent and the compound, as well as between the solvent and the compound. When the interaction between the adsorbent and the compound is stronger than that between the solvent and the compound, the compound is retained by the adsorbent; otherwise, it is eluted. Understanding the interactions between the adsorbent, the compound, and the solvent is crucial for establishing and optimizing solid phase extraction methods. Therefore, this section is a core part of the solid phase extraction technology documentation.

The interactions involved in solid phase extraction can be categorized into four types: Non-polar, polar, ionic exchange, and covalent bonds. Each adsorbent can have more than one type of interaction with the target compound.

Non-Polar Interactions

Non-polar interactions refer to the forces between hydrocarbon groups on the adsorbent and hydrocarbon groups on the target compound. These groups exhibit non-polar or weakly polar characteristics and are only subject to a type of interaction known as "dispersion forces" (a type of Van der Waals force). Since most organic compounds contain varying degrees of non-polar groups, non-polar interactions will retain these compounds on adsorbents with non-polar functional groups. Unmodified silica gel does not exhibit non-polar interactions, but adsorbents obtained by bonding chain functional groups to a silica gel matrix exhibit a degree of non-polarity, making silica gel bonded phases show non-polar interactions.

C18E (silica gel bonded with octadecyl groups, end-capped) is a true non-polar adsorbent, and it interacts with target compounds primarily through non-polar interactions. C8 (silica gel bonded with octyl groups) and PH (silica gel bonded with phenyl groups) have weaker non-polar interactions compared to C18, but non-polar interactions are still the primary force for these adsorbents, with other interactions with target compounds being negligible. C2 (silica gel bonded with ethyl groups) and CN (silica gel bonded with cyanoethyl groups) have shorter carbon chains and exhibit both non-polar and polar interactions, but non-polar interactions still predominate. Adsorbents with polar and ionic functional groups (such as NH_2, PSA, SCX, SAX etc.) have strong polar characteristics, making non-polar interactions with target compounds relatively insignificant.

For polymer-based adsorbents, such as HLB, MCX, P-SAX, and PWAX, which use polystyrene/divinylbenzene copolymer as the matrix, the phenyl and vinyl groups in the adsorbent are non-polar. Non-polar interactions are a significant force between these adsorbents and target compounds. Adsorbents like MCX, P-SAX, and PWAX also exhibit strong ion-exchange interactions with ionic compounds, which is another important force.

The strength of the interactions between the adsorbent and target compounds is also influenced by the solvent environment. Generally, a strongly polar solvent environment can enhance non-polar interactions between non-polar adsorbents and target compounds. Even if the target compound contains polar groups, its non-polar portions will interact with non-polar adsorbents in a polar environment. Therefore, when using non-polar and weakly polar adsorbents, pure water is the best sample solvent as it increases non-polar interactions, promoting the retention of target compounds. On the other hand, weakly polar organic solvents can dissolve target compounds to some extent, disrupting non-polar interactions between the target compounds and adsorbents. For example, polar solvents like methanol have enough non-polar character to disrupt non-polar interactions between many weakly polar compounds and non-polar adsorbents, leading to the elution of compounds from the adsorbent. For even less polar target compounds, weak or non-polar solvents such as ethyl acetate, tert-butyl methyl ether, or n-hexane are required for elution.

In general, non-polar extraction methods have less selectivity compared to polar or ion-exchange extraction methods, especially when the target compound's structure is similar to the sample matrix components. However, non-polar interactions are very effective for separating compounds with differing structures.

In summary, when retaining target compounds through non-polar interactions (i.e., using reversed-phase solid phase extraction columns), polar solvents (especially pure water) can enhance the retention of these separations and can be chosen as sample and wash solvents. Weakly polar solvents or mixed solvents can disrupt non-polar interactions between target compounds and adsorbents, facilitating the elution of target compounds from non-polar adsorbents.

Polar Interactions

Various adsorbents exhibit polar interactions with the functional groups of target compounds. Polar interactions include hydrogen bonding, dipole-dipole interactions, induced dipole interactions, π-π interactions, and other forms of interaction forces. Polar groups typically contain atoms with significant electronegativity differences, leading to different electron density between these atoms, which imparts polarity to the functional groups. This property enables molecules with polar functional groups to interact with polar functional groups on the adsorbent.Typical polar interacting groups include hydroxyl groups, amino groups, carbonyl groups, thiol groups, double bonds, and groups containing heteroatoms (such as oxygen, nitrogen, fluorine, sulfur, and phosphorus).

Due to the strong polarity of the silica gel matrix (especially the free silanol groups), polar interactions are widespread in silica gel-bonded adsorbents. In non-polar solvents, secondary polar interactions on silica gel-bonded adsorbents are particularly pronounced, with amino and hydroxyl groups being highly sensitive to secondary interactions. Non-polar adsorbents (such as C18, C8, PH, and CH) bonded with non-polar groups are typically used to retain non-polar and weakly polar compounds. The residual silanol groups on the silica gel matrix have undergone end-capping treatment, and such adsorbents are usually operated in polar solvent environments, making secondary interactions in these silica gel-bonded adsorbents very weak. In contrast, in polar silica gel-bonded adsorbents (Silica, NH_2, PSA) and ion-exchange silica gel-bonded adsorbents (SCX, SAX), polar interactions are desired, so no end-capping treatment is needed to suppress secondary interactions.

Hydrogen bonding is one of the most significant forms of polar interaction. The condition for hydrogen bonding is that a hydrogen atom covalently bonded to an electronegative atom X (such as fluorine, chlorine, oxygen, nitrogen) comes close to another electronegative atom Y (such as fluorine, chlorine, oxygen, nitrogen), forming an X-H...Y bond mediated by hydrogen. Hydroxyl or amino groups are primary hydrogen bond donors, and functional groups that can attract hydrogen bond donors (i.e., hydrogen bond acceptors) include those containing oxygen, nitrogen, or sulfur.

Non-polar solvents can promote the retention of polar separations on polar adsorbents because non-polar solvent molecules cannot easily disrupt the polar interactions between the adsorbent and the target compound. Conversely, polar solvents can effectively disrupt these polar interactions because polar target compounds are soluble in polar solvents and polar solvents can more effectively compete with the target compounds for adsorption sites on the adsorbent.

High ionic concentrations can also disrupt polar interactions. Polar target compounds are often retained on non-polar adsorbents through secondary interactions with the silica gel matrix, but this retention is suppressed by high ionic concentrations. If secondary interactions are required, Tris buffer can be used to enhance this interaction through the adsorbent.

In summary, when retaining target compounds through polar interactions, non-polar solvents (especially n-hexane) can enhance the retention of these separations and are suitable for use as sample and wash solvents. Polar solvents and high ionic strength solvents can disrupt the polar interactions between target compounds and adsorbents, facilitating the elution of separations from polar adsorbents. Polar secondary interactions are significant factors in extracting amino or hydroxyl-containing target compounds from non-polar solvents into polar adsorbents.

Ion Interactions

Ion interactions refer to the Coulombic forces occurring between charged target compounds (either positive or negative) and adsorbents with opposite charges. Based on the nature of the ions formed by target compound groups and adsorbent groups, ion exchange interactions can be classified into two types:

A: Cationic Groups (Positive Charge): Organic compounds such as primary, secondary, tertiary amines, and quaternary ammonium compounds, as well as inorganic cations like calcium, sodium, and magnesium, can become cationic.

B: Anionic Groups (Negative Charge): Sulfonic acid, carboxylic acid, phosphoric acid, and similar groups can become anionic.

These groups have the potential to form cations or anions, but they are not ions themselves; their ionization depends on the pH of the solvent environment. For effective retention of target compounds via ion exchange, the following conditions must be met:

(1) Charge Condition: The pH of the matrix/solvent must result in both the target compound and adsorbent being charged.

(2) Competing Ions: The concentration of competing ions with the same charge as the target compound should be low in the medium/solution.

To achieve the first condition, it is important to know the pKa values of acidic or basic compounds' conjugate acids. When the environmental pH equals a compound's pKa, 50% of the compound molecules will be charged while the other 50% will be neutral. The relationship with pKa is as follows: When pH is below the pKa, the number of positively charged molecules increases; conversely, it decreases when pH is above the pKa. Similarly, when pH is above the pKa, the number of negatively charged molecules increases, and it decreases when pH is below the pKa.

To retain the target compound, the solvent/matrix pH should be in a range where both the target compound and adsorbent are charged. Specifically, the pH should be lower than the pKa of the conjugate acid of basic compounds by at least 2 units and higher than the pKa of acidic compounds by 2 units. At this pH, more than 99% of the target compound will be charged. The pH of the sample solution during loading should meet this requirement. Conversely, if the pH of the solvent system is above the pKa of the conjugate acid of basic compounds or below the pKa of acidic compounds, the target compound's ionic groups will tend towards neutrality, reducing retention. The pH of the elution solvent should meet the requirements to elute ionic target compounds.

Ion strength is also a crucial factor in ion exchange. Ion concentration measures the total concentration of all ions in the solvent/matrix environment. Since ion exchange follows a competitive mechanism, other ions with the same charge in the solvent/matrix will compete with the target compound for ion exchange sites on the adsorbent, affecting the retention of the target compound. Low ion strength enhances retention, while high ion strength weakens it.

Ion exchange adsorbents exhibit strong selectivity for specific ion groups due to the molecular properties of the adsorbent. For example, quaternary ammonium ions (a strong anion-exchange adsorbent) show a 250-fold higher selectivity for citrate compared to acetate. As a result, quaternary ammonium adsorbents equilibrated with citrate have higher retention for anionic target compounds than those equilibrated with acetate. Similarly, for anionic target compounds retained on quaternary ammonium adsorbents, citrate buffer elutes them much more effectively than acetate buffer. Proper use of adsorbent selectivity (for opposite ions) can greatly improve ion exchange extraction.

Due to the presence of unbonded silanol groups on the silica gel matrix, which can partially dissociate protons to form negative charges, all silica gel-bonded phases exhibit ion secondary interactions. These interactions are significant in aqueous environments, with amine groups being the most affected by ion secondary interactions. For example, when amino compounds in water samples are retained on non-polar adsorbents, secondary ion interactions might also play a role. During elution with water/organic solvent mixtures (such as methanol-water), secondary interactions become more pronounced. Despite methanol's ability to disrupt non-polar interactions, active secondary interactions can inhibit the elution of amine compounds. To disrupt secondary adsorption, adjustments in pH (higher pH to neutralize basic compounds; lower pH to neutralize silanol groups) or the addition of competitors (such as diethylamine or triethylamine) in the elution solvent can be used. Competitors will compete with amine compounds for the silanol groups on the adsorbent, breaking secondary adsorption and facilitating the elution of amine compounds. Commonly used silica gel-bonded reversed-phase adsorbents, such as C18, C8, PH, CH, and C2, are end-capped during synthesis, so their ion secondary interactions are minimal. Sometimes, to increase the retention of amine compounds, end-capping is intentionally omitted during the synthesis of silica gel-bonded reversed-phase adsorbents, such as in C18 (non-end-capped).

Polymer-based adsorbents do not contain silanol groups, so they do not exhibit ion secondary interactions. Common ion exchange adsorbents include SCX and SAX. SCX, which is silica gel-bonded with benzenesulfonic acid groups, is very suitable for retaining amine compounds. SAX, which is silica gel-bonded with quaternary ammonium groups, is ideal for retaining compounds with carboxyl and phenolic hydroxyl groups. MCX, PSAX, and PWCX, P-WAX are polymer-based ion exchange reversed-phase adsorbents that combine ion exchange and reversed-phase retention, providing superior purification effects.

To enhance ion exchange and retention of target compounds:
- Maintain the pH of the solvent/matrix between the pKa values of the target compound and adsorbent.
- Use low ion strength in the solvent/matrix.
- Equilibrate the adsorbent with low-selectivity opposite ions.

To promote elution from ion exchange adsorbents:
- Ensure the pH of the solvent/matrix is above the pKa of the conjugate acid of basic compounds or below the pKa of acidic compounds.
- Use high ion strength in the solvent/matrix.
- Include high-selectivity opposite ions in the solvent/medium.
- Ion secondary interactions are significant for the retention of protonated amine compounds in polar solvents.

Note: Opposite ions are ions with charges opposite to those of the ion groups on the adsorbent.

Operation Method of SPE

Solid Phase Extraction (SPE) is a purification technique that can be categorized into two modes: retaining target compounds and retaining interfering substances.

1. Retaining Target Compounds

The solid-phase extraction mode for retaining target compounds refers to a process where, as the sample solution passes through the adsorbent, the target compound and some interfering substances are retained, while most of the interfering substances are flushed out with the solvent. Then, a wash solution is added to remove the retained interfering substances, and finally, the target compound is eluted with an elution solution. This purification mechanism is the most commonly used method.

In the mode of retaining target compounds, the SPE process involves the following steps:

(1) **Activation/equilibrium:** Activate the adsorbent in the column with an organic solvent to remove any contaminants or interfering substances that may be present in the adsorbent. Then equilibrate the adsorbent with a solution that matches the sample solvent to create a suitable environment for sample loading.

(2) **Sample loading:** Add the sample solution to the column. During this step, the target compound and some interfering substances are retained by the adsorbent, while the rest of the interfering substances are eluted with the sample solvent.

(3) **Washing:** Add a washing solution that has a higher elution strength than the sample solvent but does not elute the target compound. This step cleans the adsorbent by removing the retained interfering substances.

(4) **Elution:** Add an elution solution that can effectively elute the target compound from the adsorbent. Collect the eluate for direct analysis or further processing.

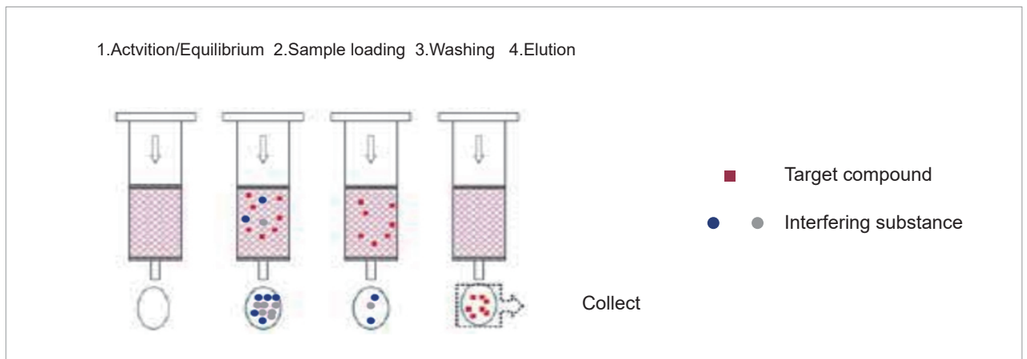
Key Considerations:

Selection of Sample Solvent: The sample solvent must not elute the target compound during the sample loading step.

Selection of Washing Solution: The washing solution should maximize the removal of interfering substances without eluting the target compound.

Selection of Elution Solution: The elution solution must be chosen to ensure that it completely elutes the target compound.

The success of the SPE method depends significantly on the careful selection of the sample solvent, washing solution, and elution solution. The optimization of these solutions will be discussed in the section on “Optimization of Solid Phase Extraction Methods.



2. Retaining Interfering Substances

The solid-phase extraction mode for retaining interfering substances refers to a process where, as the sample solution passes through the adsorbent, the main interfering substances are retained, while the target compound and some impurities are flushed out with the solvent. By adding an appropriate amount of solvent, the target compound is completely eluted. This mechanism is often used for analyzing multiple pesticide residues in fruits and vegetables, as well as for removing lipophilic interfering substances in ion analysis.

In the mode of retaining interfering substances, the SPE process involves the following steps:

(1) Activation/equilibrium: Use a solution that matches the sample solvent to activate and equilibrate the column, creating a suitable environment for sample loading.

(2) Sample loading: Add the sample solution to the column. During this step, the main interfering substances are retained by the adsorbent, while the target compounds and some impurities flow out with the sample solvent. Collect the eluate.

(3) Washing: Wash the column with a small amount of solvent that matches the sample solvent to remove any residual target compounds from the adsorbent. Collect this eluate and combine it with the eluate collected in the sample loading step.

Key Considerations:

Selection of Activation Solution: The activation solution should match the sample solvent to ensure proper equilibration of the adsorbent.

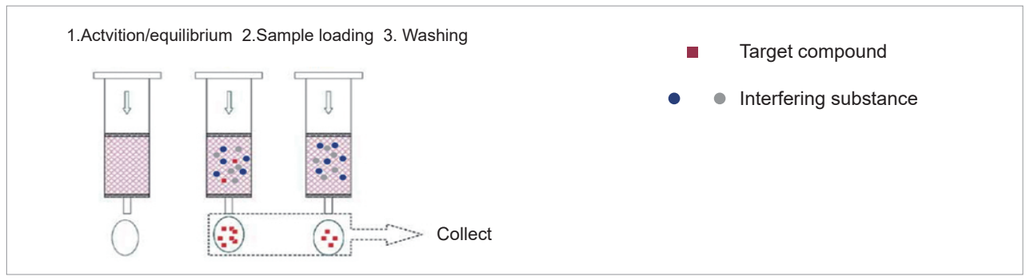
Selection of Sample Solvent: The sample solvent should not interfere with the retention of the main interfering substances.

Selection of Washing Solution: The washing solution should also match the sample solvent to effectively remove the target compounds without affecting the retention of the interfering substances.

Selection of Adsorbents and Solvent Systems:

For Polar Interferents: Use polar adsorbents such as silica gel or amino adsorbents. Choose weakly polar to non-polar solvent systems for both the sample solvent and washing solution.

For Weakly Polar or Non-Polar Interferents: Use non-polar adsorbents such as C18 or HLB. Select polar solvent systems, such as pure water, for the sample solvent and washing solution.



General operation method of reversed-phase SPE column

Activation/equilibrium: Activate with pure methanol, equilibrate with pure water or sample solvent

Sample loading: Add sample solvent containing the target compound to the column

Washing: Wash with pure water, a water solution containing an appropriate proportion of methanol, or sample solvent.

Elution: Elute with a water solution containing an appropriate amount of organic solvent, methanol, or a more non-polar organic solvent.

General operation method of normal phase SPE column

Activation/equilibrium: activate or equilibrate with hexane or sample solvent

Sample loading: add sample solvent containing the target compound to the column

Washing: Wash with n-hexane, n-hexane containing an appropriate amount of moderately polar organic solvent, or sample solvent.

Elution: Elute with n-hexane solution containing an appropriate amount of moderately polar organic solvent or moderately polar organic solvent.

General operation method of cation exchange SPE column

Activation/equilibrium: When the sample solvent is a nonpolar solvent, activate and equilibrate with the sample solvent. When the sample solvent is a polar solvent, first activate with a water-soluble organic solvent, then equilibrate with the sample solvent.

Sample loading: add sample solvent containing the target compound to the column

Washing: Wash sequentially with water and organic solvent.

Elution: Elute with a water solution or organic solvent solution with a pH at least two units higher than the pKa of the conjugate acid of the basic compound. Commonly used eluents include ammonia solution and ammonia-methanol solution.

General operation method of anion exchange SPE column

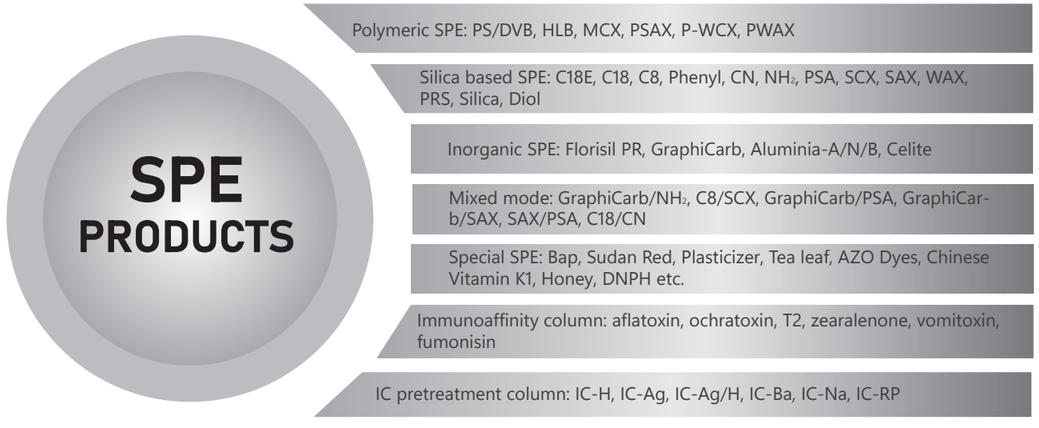
Activation/equilibrium: When the sample solvent is a nonpolar solvent, activate and equilibrate with the sample solvent. When the sample solvent is a polar solvent, first activate with a water-soluble organic solvent, then equilibrate with the sample solvent.

Sample loading: add sample solvent containing the target compound to the column

Washing: Wash sequentially with water and organic solvent.

Elution: Elute with a water solution or organic solvent solution with a pH at least two units lower than the pKa of the acidic compound. Commonly used eluents include formic acid solution and formic acid-methanol solution.

WELCHROM® SPE INTRODUCTION AND ORDERING INFORMATION



Welchrom® Polymeric SPE

Welchrom polymer based packing materials have overcome the shortcomings of traditional silica matrix packing materials, and the use proportion of SPE has been increasing gradually.

(1) Broad pH Range: They are suitable for a wide pH range (0-14) and compatible with most organic solvents.

(2) No Active Hydroxyl Groups: The polymer surface lacks active hydroxyl groups, eliminating the secondary adsorption effects that can lead to reduced recovery rates of basic compounds.

(3) High Adsorption Capacity: The polymer matrix has a high adsorption capacity for most organic substances and higher recovery rates, with easy quantitative elution and better reproducibility of analytical results.

(4) Low Detection Limits: The high recovery rate and capacity reduce detection limits and the amount of polymer adsorbent needed.

(5) No Hydrolysis Contamination: The polymer adsorbent does not contaminate expensive extracts due to the hydrolysis of bonded phases.

(6) High Interference Stability: Polymer matrix extraction columns can be re-wet if they accidentally dry out during sample preparation, maintaining their performance without the risk of losing analytes or affecting result reproducibility.

Currently available options include HLB, MCX, P-WCX, PWAX, PSAX, and PS/DVB for sample processing.

Different ion groups bonded to the phenyl rings of Welchrom® HLB result in mixed-mode ion exchange reversed-phase adsorbents:

(1) MCX: A mixed-mode strong cation exchange reversed-phase adsorbent, bonded with sulfonic acid groups, combining cation exchange and reversed-phase retention. It is suitable for basic compounds with conjugate acids having pKa values between 2-10, mainly amino compounds.

(2) PSAX: A mixed-mode strong anion exchange reversed-phase adsorbent, bonded with quaternary ammonium groups, combining anion exchange and reversed-phase retention. It is suitable for carboxylic acid compounds with pKa values between 2-8.

(3) P-WCX: A mixed-mode weak cation exchange reversed-phase adsorbent, bonded with carboxyl groups, combining weak cation exchange and reversed-phase retention. It is suitable for strongly basic compounds with conjugate acids having pKa values greater than 10, such as compounds containing quaternary ammonium groups.

(4) PWAX: A mixed-mode weak anion exchange reversed-phase adsorbent, bonded with piperazine groups, combining weak anion exchange and reversed-phase retention. It is suitable for strongly acidic compounds with pKa values less than 1, such as compounds containing sulfonic acid or phosphoric acid groups.

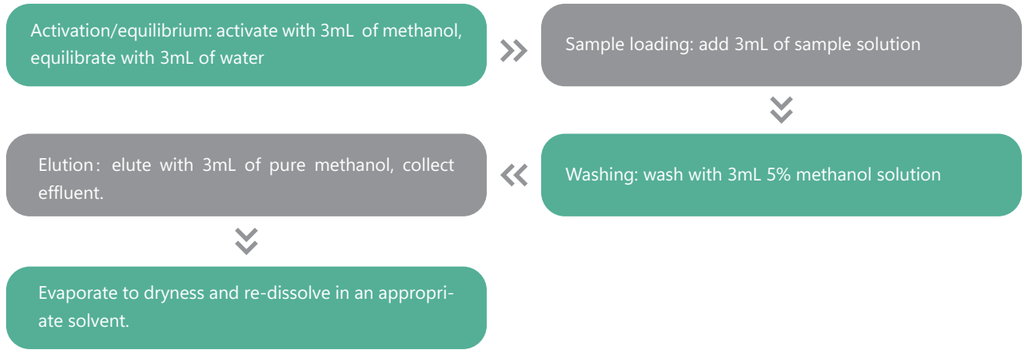
1. Welchrom® HLB

Welchrom® HLB is a monodisperse hydrophilic-hydrophobic balance reversed-phase adsorbent, which is a polymer adsorbent modified through surface modification to introduce polar functional groups. It is used for the separation of both polar and non-polar substances, with an adsorption capacity 3-10 times greater than that of C18-bonded silica stationary phases. It is effective for the extraction and separation of drugs such as atropine, ibuprofen, fenoprofen, indomethacin, caffeine, theobromine, and diazepam. It is comparable to Waters' Oasis® HLB solid-phase extraction columns.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m²
Function groups	Phenyl, vinyl, pyrrolidone
Retention mechanism	Reversed-phase retention

General operation method of Welchrom® HLB (Take Welchrom® HLB, 60 mg/3 ml as an example)



Application

1. Food Safety Testing: Analysis of drug residues in animal samples, such as tetracyclines, chloramphenicol, sulfonamides, avermectin, quinolones, macrolide antibiotics, nitrofurans, and their metabolites; pesticide residue analysis in plant samples; detection of food additives in food, such as dimethyl fumarate, neotame, and sucralose.

2. Environmental Monitoring: Analysis of PAHs, PAEs, phenolic compounds, bisphenol A, and triazine herbicides in water and soil.

3. Biological Samples: Analysis of drugs in blood and urine, such as tetracyclines, cocaine and its metabolites, morphine and its metabolites, barbiturates, tricyclic antidepressants, and ranitidine.

Ordering information of Welchrom® HLB

P/N	Description	P/N	Description
00589-20015	Welchrom® HLB, 30 mg/1 ml, 100 pk	00589-20014	Welchrom® HLB, 200 mg/6 ml, 30 pk
00589-20001	Welchrom® HLB, 100 mg/1 ml, 100 pk	00589-20006	Welchrom® HLB, 500 mg/6 ml, 30 pk
00589-20009	Welchrom® HLB, 60 mg/3 ml, 50 pk	00589-20007	Welchrom® HLB 1000 mg/6 ml, 30 pk
00589-20002	Welchrom® HLB, 100 mg/3 ml, 50 pk	00589-20106	Welchrom® HLB, 500 mg/12 ml, 20 pk
00589-20003	Welchrom® HLB, 150 mg/3 ml, 50 pk	00589-20075	Welchrom® HLB, 1 g/12 ml, 20 pk
00589-20004	Welchrom® HLB, 200 mg/3 ml, 50 pk	00589-20115	Welchrom® HLB, 1 g/30 ml, 10 pk
00589-20090	Welchrom® HLB, 225 mg/3 ml, 50 pk	00589-20008	Welchrom® HLB, 2 g/12 ml, 20 pk
00589-20049	Welchrom® HLB, 400 mg/3 ml, 50 pk	00589-20096	Welchrom® HLB, 2.5 g/30 ml, 10 pk
00589-20005	Welchrom® HLB, 500 mg/3 ml, 50 pk	00589-20017	Welchrom® HLB, 10g/bottle
00589-20043	Welchrom® HLB, 150 mg/6 ml, 30 pk	00589-20018	Welchrom® HLB, 100g/bottle



2. Welchrom® PS/DVB

Welchrom® PS/DVB is a polymer adsorbent based on highly cross-linked polystyrene/divinylbenzene copolymer. It features an extremely high specific surface area (800 m^2/g) and very high adsorption capacity. It is used for the rapid adsorption and separation of hydrophobic substances such as phenols, surfactants, bromofluorocarbons, antibiotics, amino acids, and peptides. It can extract polar compounds that are not sufficiently retained by C18 and C8 stationary phases. It is equivalent to Bond Elute LMS and Bond Elute PPL.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m^2
Function groups	Phenyl, vinyl
Retention mechanism	Reversed-phase retention

Application

1. Food Safety Testing: Analysis of drug residues in animal samples; analysis of pesticide residues in plant samples; analysis of food additives in seasonings and processed foods; analysis of antioxidants in vegetable oils.

2. Environmental Monitoring: Analysis of phenolic compounds.

3. Biological Samples: Analysis of drugs in blood and urine.

Ordering information of Welchrom® PS/DVB

P/N	Description	P/N	Description
00571-20015	Welchrom® PS/DVB, 30 mg/1 ml, 100 pk	00571-20005	Welchrom® PS/DVB, 500 mg/3 ml, 50 pk
00571-20001	Welchrom® PS/DVB, 100 mg/1 ml, 100 pk	00571-20097	Welchrom® PS/DVB, 60 mg/6 ml, 30 pk
00571-20009	Welchrom® PS/DVB, 60 mg/3 ml, 50 pk	00571-20084	Welchrom® PS/DVB, 100 mg/6 ml, 30 pk
00571-20002	Welchrom® PS/DVB, 100 mg/3 ml, 50 pk	00571-20043	Welchrom® PS/DVB, 150 mg/6 ml, 30 pk
00571-20003	Welchrom® PS/DVB, 150 mg/3 ml, 50 pk	00571-20014	Welchrom® PS/DVB, 200 mg/6 ml, 30 pk
00571-20004	Welchrom® PS/DVB, 200 mg/3 ml, 50 pk	00571-20006	Welchrom® PS/DVB, 500 mg/6 ml, 30 pk
00571-20012	Welchrom® PS/DVB, 250 mg/3 ml, 50 pk		

3. Welchrom® MCX

Polymer matrix adsorbents often exhibit mixed retention mechanisms, and this is also true for Welchrom® polymer matrix SPE products. Welchrom® MCX is a mixed adsorbent with strong cation exchange functionality and hydrophobic interaction as a reversed-phase chromatography stationary phase. It is bonded with strong acidic sulfonic acid functional groups, selectively retaining both basic and neutral compounds. It is commonly used for the extraction of basic substances such as melamine, amphetamine, diphenhydramine, and phenylcyclohexylamine. It is equivalent to Waters' Oasis® MCX.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m²
Function groups	Pyrrolidone, benzene sulfonic acid functional groups, phenyl, vinyl
Retention mechanism	Reversed-phase retention and strong cationic mechanism

General operation method of Welchrom® MCX(Take Welchrom® MCX, 60mg/3mL as an example)

Activation/equilibrium: activate with 3 mL of methanol, equilibrate with 3 mL of water

Sample loading: add 3 mL of acidified sample solution

Washing A: 3 mL pf 0.1 mol/L HCl

Washing B: Wash with 3 mL of methanol-water in a specific ratio

Elution: Elute with 3 mL of 5% ammonia water-methanol solution.

Evaporate to dryness and re-dissolve in an appropriate solvent.

Application

1. Food Safety Testing: Analysis of melamine; analysis of basic drug residues in animal samples, such as metronidazole, nitroimidazoles, sulfonamides, and clenbuterol; analysis of basic pesticides in vegetables, fruits, and fruit juices, such as carbendazim and thiophanate-methyl.

2. Biological Samples: Analysis of basic drugs in blood and urine.

Ordering information of Welchrom® MCX

P/N	Description	P/N	Description
00583-20015	Welchrom® MCX, 30 mg/1 ml, 100 pk	00583-20043	Welchrom® MCX, 150 mg/6 ml, 30 pk
00583-20001	Welchrom® MCX, 100 mg/1 ml, 100 pk	00583-20014	Welchrom® MCX, 200 mg/6 ml, 30 pk
00583-20016	Welchrom® MCX, 60 mg/3 ml, 50 pk	00583-20006	Welchrom® MCX, 500 mg/6 ml, 30 pk
00583-20002	Welchrom® MCX, 100 mg/3 m, 50 pk	00583-20007	Welchrom® MCX, 1 g/6 ml, 30 pk
00583-20003	Welchrom® MCX, 150 mg/3 ml, 50 pk	00583-20075	Welchrom® MCX, 1 g/12 ml, 20 pk
00583-20004	Welchrom® MCX, 200 mg/3 ml, 50 pk	00583-20005	Welchrom® MCX, 500 mg/3 ml, 50 pk

4. Welchrom® PSAX

Welchrom® PSAX is a mixed-phase adsorbent with strong anion exchange functionality and reverse-phase hydrophobic properties. It contains quaternary ammonium functional groups and is typically used for the separation and purification of acidic substances from basic and neutral impurities, such as phosphoric acid, estrogen, adenine, and nucleosides. The polymer-based Welchrom® PSAX is resistant to many organic solvents and is stable in aqueous solutions across a pH range of 0-14.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m²
Function groups	Pyrrolidone, quaternary ammonium functional groups, phenyl, vinyl
Retention mechanism	Reversed-phase retention and strong anionic mechanism

Application

1. Detection and analysis of food additives in foods and seasonings, such as benzoic acid, sorbic acid, dehydroacetic acid, vanillin, methylvanillin, and ethylvanillin.
2. Detection and analysis of mycotoxins in food, such as patulin, citrinin, ochratoxin A, and mycophenolic acid.
3. Analysis of components in herbs, such as the detection of 6-gingerol, curcumin, and piperine in turmeric.
4. Detection of caffeine in spirits.
5. Analysis of pesticide residues in food, such as sodium pentachlorophenate and cyhalothrin.

Ordering information of Welchrom® PSAX

P/N	Description	P/N	Description
00572-20015	Welchrom® PSAX, 30 mg/1 ml, 100 pk	00572-20084	Welchrom® PSAX, 100 mg/6 ml, 30 pk
00572-20001	Welchrom® PSAX, 100 mg/1 ml, 100 pk	00572-20043	Welchrom® PSAX, 150 mg/6 ml, 30 pk
00572-20016	Welchrom® PSAX, 60 mg/3 ml, 50 pk	00572-20014	Welchrom® PSAX, 200 mg/6 ml, 30 pk
00572-20002	Welchrom® PSAX, 100 mg/3 ml, 50 pk	00572-20006	Welchrom® PSAX, 500mg/6ml, 30 pk
00572-20003	Welchrom® PSAX, 150 mg/3 ml, 50 pk	00572-20007	Welchrom® PSAX, 1000 mg/6 ml, 30 pk
00572-20004	Welchrom® PSAX, 200 mg/3 ml, 50 pk	00572-20075	Welchrom® PSAX, 1 g/12 ml, 20 pk
00572-20005	Welchrom® PSAX, 500 mg/3 ml, 50 pk	00572-20097	Welchrom® PSAX, 60 mg/6 ml, 30 pk

5. Welchrom® P-WCX

Welchrom® P-WCX column are packed with a polymer-based weak cation exchange adsorbent. The retention mechanism combines weak cation exchange with reversed-phase retention. The P-WCX column packing is bonded with carboxylic acid groups, making it suitable for the separation and purification of strongly basic compounds. The divinylbenzene polymer matrix ensures that the column maintains stable performance even under high pH conditions.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m²
Function groups	Pyrrolidone, carboxylic, phenyl, vinyl
Retention mechanism	Reversed-phase retention and weak cationic mechanism

General operation method of Welchrom® P-WCX (Take Welchrom® P-WCX, 60mg/3ml as an example)

Activation/equilibrium: activate with 3 mL of methanol, equilibrate with 3 mL of 5% ammonia solution

Sample loading: add 3 mL of neutral or basic sample solution

Washing A: Wash with 3 mL of 5% ammonia solution.

Washing B: Wash with 3 mL of a methanol-water mixture in a specific ratio.

Elution: Elute with 3 mL of 2% formic acid in methanol solution.

Evaporate to dryness and re-dissolve in an appropriate solvent.

Application

Separate and purify strongly basic compounds, such as those with quaternary ammonium groups.

Ordering information of Welchrom® P-WCX

P/N	Description	P/N	Description
00539-20005	Welchrom® P-WCX, 500 mg/3 ml, 50 pk	00539-20015	Welchrom® P-WCX 30mg/1ml, 100 pk
00539-20006	Welchrom® P-WCX, 500 mg/6 ml, 30 pk	00539-20016	Welchrom® P-WCX 60mg/3ml, 50 pk

6. Welchrom® PWAX

Welchrom® PWAX column is a polymer-based weak anion exchange column. The packing material exhibits both weak anion exchange and reversed-phase retention mechanisms. The piperazine group is bonded to the phenyl ring of the HLB packing, making it suitable for the separation and purification of strongly acidic substances. The divinylbenzene polymer ensures stable performance across the pH range of 0-14.

Technical parameters

Matrix	Divinyl benzene polymer
Parameter	Particle size: 40-60μm Pore size: 80Å Surface area: 800-1000m²
Function groups	Pyrrolidinone, piperazine, phenyl, vinyl
Retention mechanism	Reversed-phase retention and weak anionic mechanism

Application

1. Separation and purification of strongly acidic compounds, such as compounds containing sulfonic acid groups.
2. Detection and analysis of artificial pigment in food, better recovery effect of erythrosine than that of PA column.

Ordering information of Welchrom® PWAX

P/N	Description	P/N	Description
00577-20015	Welchrom® PWAX, 30 mg/1 ml, 100 pk	00577-20005	Welchrom® PWAX, 500 mg/3 ml, 50 pk
00577-20001	Welchrom® PWAX, 100 mg/1 ml, 100 pk	00577-20097	Welchrom® PWAX, 60 mg/6 ml, 30 pk
00577-20016	Welchrom® PWAX, 60 mg/3 ml, 50 pk	00577-20084	Welchrom® PWAX, 100 mg/6 ml, 30 pk
00577-20002	Welchrom® PWAX, 100 mg/3 ml, 50 pk	00577-20043	Welchrom® PWAX, 150 mg/6 ml, 30 pk
00577-20003	Welchrom® PWAX, 150 mg/3 ml, 50 pk	00577-20014	Welchrom® PWAX, 200 mg/6 ml, 30 pk
00577-20004	Welchrom® PWAX, 200 mg/3 ml, 50 pk	00577-20006	Welchrom® PWAX, 500 mg/6 ml, 30 pk

7. Welchrom® PA

Adsorbent of Welchrom® PA column is polyamide, a polymeric compound containing amide groups in the molecular backbone repeating unit, commonly known as "nylon". Amide groups can form hydrogen bonds with polar compounds and have a good adsorption and retention effect on polar compounds. Both column and packing materials are suitable for the determination of synthetic colorants in food such as lemon yellow, new red, amaranth red, carmine red, sunset yellow, bright blue and so on or the removal of pigment in samples.

Application

Determination of synthetic colorants in food.
Leather and fur - Determination of hexavalent chromium content - Spectrophotometric method.

Ordering information of Welchrom® PA

P/N	Description	P/N	Description
00541-20001	Welchrom® PA,100mg/1mL,100pk	00541-20008	Welchrom® PA,2g/12mL,20pk
00541-20002	Welchrom® PA,100mg/3mL,50pk	00541-20009	Welchrom® PA,60mg/3mL,50pk
00541-20003	Welchrom® PA,150mg/3mL,50pk	00541-20014	Welchrom® PA,200mg/6mL,30pk
00541-20004	Welchrom® PA,200mg/3mL,50pk	00541-20100	Welchrom® PA,3g/12mL,20pk
00541-20005	Welchrom® PA,500mg/3mL,50pk	00541-20114	Welchrom® PA,4g/60mL,10pk
00541-20006	Welchrom® PA,500mg/6mL,30pk	00541-20017	Welchrom® PA,10g/bottle
00541-20007	Welchrom® PA,1g/6mL,30pk	00541-20018	Welchrom® PA,100g/bottle

Welchrom® Silica Based SPE

Welchrom® silica-based SPE products use high-quality, high-purity amorphous silica with an average particle size of 45 μm, an average pore size of 60 Å, a pore volume of 0.80 cm^3/g, and a specific surface area of 480 m^2/g. This type of silica provides moderate resistance and flow rate during extraction, making it an ideal choice. Additionally, the bonding silica uses Welchrom's unique surface treatment process, and the bonding phase employs a more stable trivalent bonding method, ensuring consistent extraction and recovery rates for analytes. Silica or bonded silica remains the most commonly used adsorbent in SPE, with a pH range of 2-7.5. Silica-based adsorbents offer a wide variety of options. Welchrom® SPE includes 13 types of silica-based phases: C18E (end-capped), C18 (non-end-capped), C8, Phenyl, CN, NH_2, PSA, SCX, SAX, WAX, PRS, Silica, and Diol.

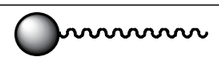
General properties of silica-based adsorbent:

1. The functional groups bonded to the silica surface primarily determine the retention of target compounds. Depending on the type of bonded functional groups, the retention mechanisms include reversed-phase retention, normal-phase retention, and ion-exchange retention.
2. Silica-bonded adsorbents are stable within a pH range of 2-7.5.
3. Silica-bonded adsorbents exhibit rigidity and do not shrink or expand during solvent transformation, achieving equilibrium quickly in new solvents.
4. The silica matrix consists of spherical silica with a particle size of 40-63 μm, with uniform particle size and smooth surface, allowing solvents to pass through even without pressure. The characteristic pore size of silica-bonded adsorbents is approximately 60 Å, suitable for compounds with a molecular weight less than 15,000. Reversed-phase adsorbents are end-capped, while normal-phase and ion-exchange adsorbents are not.

1. Welchrom® C18E

Welchrom® C18E is an end-capped C18 adsorbent, known for being the most hydrophobic silica-based adsorbent. It exhibits excellent strong retention characteristics for non-polar compounds and retains most organic substances, making it the most widely used SPE adsorbent. Since C18E retains most organic substances in aqueous matrices, it has minimal selectivity and is commonly used for processing samples with various structures or significant structural differences. Additionally, because C18E does not retain salts at all, it can often replace ion-exchange columns for desalting small molecules and some medium-sized molecules.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	C18 alkyl chain
Endcapped	Yes
Carbon loading	17%
Retention mechanism	Reversed-phase retention

Application

1. Extraction of Organic Contaminants in Water: PAHs, PAEs, PCBs, phenolic substances, microcystin toxins, and pesticide residues (such as abamectin, naphthalene, atrazine, etc.).

2. Life Sciences: Extraction of drugs and their metabolites from plasma, serum, and urine; extraction of pesticide and veterinary drug residues from food.

3. Extraction of Plant and Animal Components: Essential oils, fat-soluble vitamins, water-soluble vitamins, carbohydrates, organic acids, steroids, and desalting of biomolecules.

4. Food Safety: Detection and analysis of food additives such as neotame; detection and analysis of contaminants in food contact materials and products, such as acrylamide and bisphenol A; pesticide residue analysis in food, such as glyphosate and abamectin.

Ordering information of Welchrom® C18E

P/N	Description	P/N	Description
00559-11001	Welchrom® C18E, 100 mg/1 ml, 100 pk	00559-11013	Welchrom® C18E, 250 mg/6 ml, 30 pk
00559-11015	Welchrom® C18E, 30 mg/1 ml, 100 pk	00559-11069	Welchrom® C18E, 300 mg/6 ml, 30 pk
00559-11009	Welchrom® C18E, 60 mg/3 ml, 50 pk	00559-11087	Welchrom® C18E, 350 mg/6 ml, 30 pk
00559-11045	Welchrom® C18E, 30 mg/3 ml, 50 pk	00559-11006	Welchrom® C18E, 500 mg/6 ml, 30 pk
00559-11002	Welchrom® C18E, 100 mg/3 ml, 50 pk	00559-11007	Welchrom® C18E, 1 g/6 ml, 30 pk
00559-11003	Welchrom® C18E, 150 mg/3 ml, 50 pk	00559-11008	Welchrom® C18E, 2 g/12 ml, 2 0pk
00559-11004	Welchrom® C18E, 200 mg/3 ml, 50 pk	00559-11035	Welchrom® C18E, 5 g/30 ml, 10 pk
00559-11012	Welchrom® C18E, 250 mg/3 ml, 50 pk	00559-11107	Welchrom® C18E, 1 g/60 ml, 10 pk
00559-11066	Welchrom® C18E, 300 mg/3 ml, 50 pk	00559-11042	Welchrom® C18E, 5 g/60 ml, 10 pk
00559-11022	Welchrom® C18E, 360 mg/3 ml, 50 pk	00559-11041	Welchrom® C18E, 10 g/60 ml, 10 pk
00559-11005	Welchrom® C18E, 500 mg/3 ml, 50 pk	00559-11115	Welchrom® C18E, 1 g/30 ml, 10 pk

2. Welchrom® C8

Welchrom® C8 adsorbent is similar to C18 in terms of adsorption properties, relying mainly on non-polar interactions. However, because the C8 alkyl chain is shorter than the C18 alkyl chain, its retention of non-polar compounds is weaker compared to C18, which helps in eluting samples with excessively strong non-polar adsorption. C8 columns can simultaneously extract both lipid-soluble and water-soluble vitamins from plasma and are also commonly used for desalting biomolecular samples. Welchrom® C8 is a commonly used non-polar adsorbent. For basic analytes, using C8 adsorbent can increase extraction efficiency and improve recovery rates.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Octane group
Endcapped	Yes
Carbon loading	12%
Retention mechanism	Reversed-phase retention

Application

1. Extraction of Organic Contaminants in Water: PAHs, PAEs, PCBs, pesticides, herbicides, phenolic compounds, etc.
2. Life Sciences: Extraction of drugs and their metabolites from plasma, serum, and urine.
3. Pesticide and Veterinary Drug Residue Extraction in Foods.
4. Extraction of Plant and Animal Components: Aromatic oils, fat-soluble vitamins, water-soluble vitamins, carbohydrates, organic acids, steroids, etc.
5. Desalting of Biomolecules.

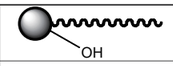
Ordering information of Welchrom® C8

P/N	Description	P/N	Description
00505-11001	Welchrom® C8, 100 mg/1 ml, 100 pk	00505-11005	Welchrom® C8, 500 mg/3 ml, 50 pk
00505-11002	Welchrom® C8, 100 mg/3 ml, 50 pk	00505-11006	Welchrom® C8, 500 mg/6 ml, 30 pk
00505-11003	Welchrom® C8, 150 mg/3 ml, 50 pk	00505-11007	Welchrom® C8, 1 g/6 ml, 30 pk
00505-11004	Welchrom® C8, 200 mg/3 ml, 50 pk	00505-11008	Welchrom® C8, 2 g/12 ml, 20 pk

3. Welchrom® C18

Welchrom® C18 is an unendcapped C18 adsorbent. The residual silicon hydroxyl groups on its surface provide additional polar interactions, allowing the hydrophobic adsorbent to make closer contact with more polar extracts, enhancing its retention capability for basic and polar substances. Compared to the endcapped Welchrom® C18E, Welchrom® C18 is a general-purpose adsorbent for the extraction of both polar and non-polar compounds. Welchrom® C18 has a carbon content of approximately 17%, an average particle size of 45 μm, an average pore size of 60 Å, a pore volume of 0.80 cm^3/g, and a specific surface area of 480 m^2/g.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	C18 alkyl chain, silicon hydroxyl
Endcapped	No
Carbon loading	17%
Retention mechanism	Reversed-phase retention

Application

1. Similar to C18E, but with enhanced retention for polar compounds.
2. Detection of agricultural residues in water, such as atrazine, simazine, etc.
3. Detection of food additives in baked food and processed food, such as acesulfame potassium, saccharin sodium, aspartame, etc.
4. Detection of food additives in beverages, such as acesulfame potassium, caffeine, etc.

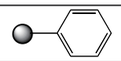
Ordering information of Welchrom® C18

P/N	Description	P/N	Description
00504-11001	Welchrom® C18, 100 mg/1 ml, 100 pk	00504-11005	Welchrom® C18, 500 mg/3 ml, 50 pk
00504-11002	Welchrom® C18, 100 mg/3 ml, 50 pk	00504-11006	Welchrom® C18, 500 mg/6 ml, 30 pk
00504-11003	Welchrom® C18, 150 mg/3 ml, 50 pk	00504-11007	Welchrom® C18, 1 g/6 ml, 30 pk
00504-11004	Welchrom® C18, 200 mg/3 ml, 50 pk	00504-11009	Welchrom® C18, 60 mg/3 ml, 50 pk
00504-11075	Welchrom® C18, 1 g/12 ml, 20 pk		

4. Welchrom® Phenyl

Welchrom® Phenyl is a phenyl-bonded SPE stationary phase. The SPE column packing of this material enhances retention of basic compounds through the unique π-π polar interactions of the phenyl ring. When extracting both aromatic and non-aromatic compounds, Welchrom® Phenyl exhibits different selectivity compared to reverse-phase stationary phases like C18 and C8. The silica gel used in Welchrom® Phenyl has an average particle size of 45 μm, a pore size of 60 Å, a pore volume of 0.80 cm^3/g, and a specific surface area of 480 m^2/g.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Phenyl group
Endcapped	Yes
Carbon loading	10%
Retention mechanism	Reversed-phase retention

Application

1. Extraction of Organic Contaminants in Water: PAHs, PAEs, PCBs, pesticides, herbicides, phenolic substances, etc.
2. Life Sciences: Extraction of drugs and their metabolites from plasma, serum, and urine.
3. Pesticide and Veterinary Drug Residue in Food: Extraction of pesticide and veterinary drug residues.
4. Extraction of Plant and Animal Components: Essential oils, fat-soluble vitamins, water-soluble vitamins, carbohydrates, organic acids, steroids, etc.

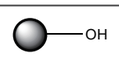
Ordering information of Welchrom® C18

P/N	Description	P/N	Description
00506-11001	Welchrom® Phenyl, 100 mg/1 ml, 100 pk	00506-11005	Welchrom® Phenyl, 500 mg/3 ml, 50 pk
00506-11002	Welchrom® Phenyl, 100 mg/3 ml, 50 pk	00506-11006	Welchrom® Phenyl, 500 mg/6 ml, 30 pk
00506-11003	Welchrom® Phenyl, 150 mg/3 ml, 50 pk	00506-11007	Welchrom® Phenyl, 1 g/6 ml, 30 pk
00506-11004	Welchrom® Phenyl, 200 mg/3 ml, 50 pk	00506-11008	Welchrom® Phenyl, 2 g/12 ml, 20 pk

5. Welchrom® Silica

Welchrom® Silica is an unbonded active silica normal-phase adsorbent, which is weakly acidic and has strong polarity. The retention of target compounds is mainly achieved through hydrogen bonding. The silica gel's surface silanol groups can ionize, and under moderate pH conditions, it functions similarly to a weak cation exchange adsorbent.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Silicon hydroxyl
Endcapped	No
Retention mechanism	Normal phase retention

Application

1. Extraction of compounds with polar groups in lipid samples.
2. Adsorption of interfering substance in extract during pesticide residue analysis.

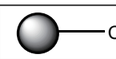
Ordering information of Welchrom® Silica

P/N	Description	P/N	Description
00500-11001	Welchrom® Silica, 100 mg/1 ml, 100 pk	00500-11006	Welchrom® Silica, 500 mg/6 ml, 30 pk
00500-11004	Welchrom® Silica, 200 mg/3 ml, 50 pk	00500-11007	Welchrom® Silica, 1 g/6 ml, 30 pk
00500-11005	Welchrom® Silica, 500 mg/3 ml, 50 pk	00500-11008	Welchrom® silica, 2 g/10 ml, 20 pk
00500-11018	Welchrom® Silica, 100 g/bottle	00500-11017	Welchrom® Silica, 10 g/ bottle

6. Welchrom® CN

Welchrom® CN is a cyano-polar bonded adsorbent that combines both polar and non-polar interactions. It can be used as a non-polar adsorbent to simultaneously extract both polar and non-polar substances from aqueous samples. It can also extract polar substances from solvents that are relatively less polar.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Cyano
Endcapped	Yes
Carbon loading	6.5%
Retention mechanism	Reversed-phase or normal phase retention

Application

Detection of pesticides, drugs and their metabolites in water samples.

Ordering information of Welchrom® CN

P/N	Description	P/N	Description
00507-11001	Welchrom® CN, 100 mg/1 ml, 100 pk	00507-11005	Welchrom® CN, 500 mg/3 ml, 50 pk
00507-11002	Welchrom® CN, 100 mg/3 ml, 50 pk	00507-11006	Welchrom® CN, 500 mg/6 ml, 30 pk
00507-11003	Welchrom® CN, 150 mg/3 ml, 50 pk	00507-11007	Welchrom® CN, 1 g/6 ml, 30 pk
00507-11004	Welchrom® CN, 150 mg/3 ml, 50 pk	00507-11008	Welchrom® CN, 2 g/12 ml, 20 pk

7. Welchrom® NH_2

Welchrom® NH_2 is an aminopropyl bonded silica adsorbent that can function both as a polar adsorbent and as a weak anion exchange adsorbent. When activated with non-polar solvents such as n-hexane, it can form hydrogen bonds with molecules containing -OH, -NH, or -SH groups. In aqueous environments with a pH < 7.8, it can act as a weak anion exchange adsorbent.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Aminopropyl
Endcapped	No
Carbon loading	3.5%
Retention mechanism	Normal phase retention or weak anion exchange

Application

1. Can be used to separate structural isomers.
2. Extraction of compounds with polar groups in lipid samples, such as thiomersal in skin care products.
3. Used in agricultural residue analysis to remove polar compounds (such as carbohydrates and pigments), organic acids, phenols, etc.
4. Detection of synthetic colorants in beverages, condiments and processed meats, such as acid orange II, etc.

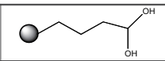
Ordering information of Welchrom® NH_2

P/N	Description	P/N	Description
00509-11001	Welchrom® NH_2, 100 mg/1 ml, 100 pk	00509-11005	Welchrom® NH_2, 500mg/3mL,50pk
00509-11002	Welchrom® NH_2, 100 mg/3 ml, 50 pk	00509-11006	Welchrom® NH_2, 500mg/6mL,30pk
00509-11003	Welchrom® NH_2, 150 mg/3 ml, 50 pk	00509-11007	Welchrom® NH_2, 1g/6mL,30pk
00509-11004	Welchrom® NH_2, 200 mg/3 ml, 50 pk	00509-11008	Welchrom® NH_2, 2g/12mL,20pk
00509-11035	Welchrom® NH_2, 5 g/30 ml, 10 pk		

8. Welchrom® Diol

Welchrom® Diol is a silica-based SPE polar adsorbent with bonded diol groups. Depending on the activation conditions and sample matrix, it can also exhibit weak non-polar interactions, allowing it to extract non-polar substances from aqueous samples. In most cases, it is used as a polar adsorbent, similar to unbonded silica in its polar interactions, extracting polar molecules from non-polar solvents. It is useful for separating isomers and other structurally similar compounds.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Diol
Endcapped	No
Retention mechanism	Normal phase retention

Application

Separation and purification of polar target compounds or compounds with moderate polarity.

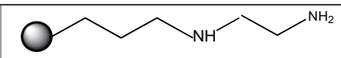
Ordering information of Welchrom® Diol

P/N	Description	P/N	Description
00510-11001	Welchrom® Diol, 100 mg/1 ml, 100 pk	00510-11005	Welchrom® Diol, 500 mg/3 ml, 50 pk
00510-11002	Welchrom® Diol, 100 mg/3 ml, 50 pk	00510-11006	Welchrom® Diol, 500 mg/6 ml, 30 pk
00510-11003	Welchrom® Diol, 150 mg/3 ml, 50 pk	00510-11007	Welchrom® Diol, 1 g/6 ml, 30 pk
00510-11004	Welchrom® Diol, 200 mg/3 ml, 50 pk		

9. Welchrom® PSA

Welchrom® PSA is an adsorbent similar to NH_2. PSA contains two amino groups with pKa values of 10.1 and 10.9. It has a stronger ion exchange capability compared to NH_2 solid phase extraction columns. PSA is generally used in anionic exchange retention mode. Its packing material matrix is silica with an average particle size of 45 μm, pore size of 60 Å, pore volume of 0.80 cm^3/g, and a specific surface area of 480 m^2/g.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Ethylenediamine
Endcapped	No
Carbon loading	7%
Retention mechanism	Normal phase retention or weak anion exchange

Application

1. Separation of Structural Isomers: Can be used to separate compounds with similar structures, such as isomers.

2. Extraction of Polar Compounds in Lipid Samples: Suitable for extracting compounds with polar functional groups from lipid samples.

3. Removal of Polar Compounds in Pesticide Residue Analysis: Used to remove polar compounds (such as carbohydrates, pigments), organic acids, phenols, etc., from extraction solutions. For example, detecting acid orange II in processed meat products.

4. Pesticide Residue Detection in Vegetables: Applied for analyzing pesticide residues in vegetables, such as imidacloprid, difenoconazole, methomyl, cyromazine, and chlorpyrifos.

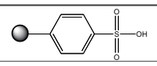
Ordering information of Welchrom® PSA

P/N	Description	P/N	Description
00508-11001	Welchrom® PSA, 100 mg/1 ml, 100 pk	00508-11043	Welchrom® PSA, 150 mg/6 ml, 30 pk
00508-11002	Welchrom® PSA, 100 mg/3 ml, 50 pk	00508-11006	Welchrom® PSA, 500 mg/6 ml, 30 pk
00508-11003	Welchrom® PSA, 150 mg/3 ml, 50 pk	00508-11007	Welchrom® PSA, 1 g/6 ml, 30 pk
00508-11004	Welchrom® PSA, 200 mg/3 ml, 50 pk	00508-11008	Welchrom® PSA, 2 g/12 ml, 20 pk
00508-11005	Welchrom® PSA, 500 mg/3 ml, 50 pk	09508-11014	Welchrom® PSA, 200 mg/6 ml, 30 pk/glass
09508-11007	Welchrom® PSA, 1 g/6 ml, 30 pk, glass	09508-11006	Welchrom® PSA, 500 mg/6 ml, 30 pk/glass

10. Welchrom® SCX

Welchrom® SCX (Strong Cation Exchange) is a strong cation exchange extraction column with a silica gel matrix, bonded with benzenesulfonic acid groups.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Benzene sulfonic acid group
Endcapped	No
Carbon loading	2%
Retention mechanism	Normal phase retention or cation exchange

Application

Purification of alkaline compounds in aqueous samples, biological fluids and organic phases and detection of niacin and niacinamide in skin care products and agricultural residues in vegetables, such as cyromazine.

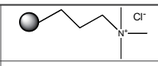
Ordering information of Welchrom® SCX

P/N	Description	P/N	Description
00512-11001	Welchrom® SCX, 100mg/1 ml, 100 pk	00512-11004	Welchrom® SCX, 200 mg/3 ml, 50 pk
00512-11009	Welchrom® SCX, 60 mg/3 ml, 50 pk	00512-11005	Welchrom® SCX, 500 mg/3 ml, 50 pk
00512-11002	Welchrom® SCX, 100 mg/3 ml, 50 pk	00512-11006	Welchrom® SCX, 500 mg/6 ml, 30 pk
00512-11003	Welchrom® SCX, 150 mg/3 ml, 50 pk	00512-11007	Welchrom® SCX, 1 g/6 ml, 30 pk

11. Welchrom® SAX

Welchrom® SAX (Strong Anion Exchange) is a strong anion exchange extraction column with quaternary ammonium functional groups bonded to the silica surface. It is primarily used for the adsorption and enrichment of weakly acidic target substances, such as organic acids. It is mainly used to concentrate negatively charged target substances from aqueous or non-aqueous solutions.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Quaternary ammonium group
Endcapped	No
Carbon loading	7.5%
Retention mechanism	Normal phase retention or anion exchange

Application

Purification of alkaline compounds from aqueous samples, biological fluids and organic phases.

Ordering information of Welchrom® SAX

P/N	Description	P/N	Description
00513-11001	Welchrom® SAX, 100 mg/1 ml, 100 pk	00513-11004	Welchrom® SAX, 200 mg/3 ml, 50 pk
00513-11009	Welchrom® SAX, 60 mg/3 ml, 50 pk	00513-11097	Welchrom® SAX, 60 mg/6 ml, 30 pk
00513-11002	Welchrom® SAX, 100 mg/3 ml, 50 pk	00513-11005	Welchrom® SAX, 500 mg/3 ml, 50 pk
00513-11003	Welchrom® SAX, 150 mg/3 ml, 50 pk	00513-11006	Welchrom® SAX, 500 mg/6 ml, 30 pk
00513-11007	Welchrom® SAX, 1 g/6 ml, 30 pk		

12. Welchrom® WCX

Welchrom® WCX is a weak cation exchange extraction column with silica as the matrix. The functional groups bonded to the silica surface are carboxyl groups, with a pKa of 3.8. Due to the presence of carboxylic acid groups, the anion exchange effect is not too strong, so it does not require highly alkaline eluents to elute the target compounds. Welchrom® WCX is particularly suitable for the adsorption and retention of strong cations, as strong cationic target substances interact significantly with SCX (Strong Cation Exchange) materials and are challenging to elute from SCX materials.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Carboxylic acid group
Retention mechanism	Normal phase retention or weak cation exchange

Application

Detection and analysis of alkaloids and azacyclic compounds, such as paraquat in water, rapid detection of insecticides.

Ordering information of Welchrom® WCX

P/N	Description	P/N	Description
00514-11001	Welchrom® WCX, 100 mg/1 ml, 100 pk	00514-11004	Welchrom® WCX, 200 mg/3 ml, 50 pk
00514-11009	Welchrom® WCX, 60 mg/3 ml, 50 pk	00514-11005	Welchrom® WCX, 500 mg/3 ml, 50 pk
00514-11002	Welchrom® WCX, 100 mg/3 ml, 50 pk	00514-11006	Welchrom® WCX, 500 mg/6 ml, 30 pk
00514-11003	Welchrom® WCX, 150 mg/3 ml, 50 pk	00514-11007	Welchrom® WCX, 1 g/6 ml, 30 pk

13. Welchrom® PRS

Welchrom® PRS is a strong cation exchange extraction column with silica as the matrix, bonded with propylsulfonic acid functional groups. In non-polar solvents, PRS exhibits both polarity and hydrogen bonding interactions, making it suitable for the extraction and separation of cationic target substances.

Technical parameters

Structural Formula	
Matrix	Silica gel
Parameter	Particle size: 40-60μm Pore volume: 0.80 cm^3/g Pore size: 60Å Surface area: 480m^2/g
Function groups	Propane sulfonic acid group
Retention mechanism	Normal phase retention or weak cation exchange

Application

Detection of cationic targets, alkaloids and azacyclic compounds.

Ordering information of Welchrom® PRS

P/N	Description	P/N	Description
00511-11001	Welchrom® PRS, 100 mg/1 ml, 100 pk	00511-11004	Welchrom® PRS, 200 mg/3 ml, 50 pk
00511-11009	Welchrom® PRS, 60 mg/3 ml, 50 pk	00511-11005	Welchrom® PRS, 500 mg/3 ml, 50pk
00511-11002	Welchrom® PRS, 100 mg/3 ml, 50 pk	00511-11006	Welchrom® PRS, 500 mg/6 ml, 30 pk
00511-11003	Welchrom® PRS, 150 mg/3 ml, 50 pk	00511-11007	Welchrom® PRS, 1 g/6 ml, 30 pk

14. Welchrom® Thiol

Features:

(1) Product specifications: particle size: 40-63 μm, Pore size: 60 Å, carbon loading: 1.2 mmol/g
(2) Packing mateirals have high quality and high purity;
(3) Fast reaction speed;
(4) Can be used in most solvents;
(5) Excellent lot-to-lot reproducibility, excellent reaction properties and excellent physical or chemical properties;
(6) Good mechanical stability and thermal stability.

Application

Welchrom® Thiol is highly effective in adsorbing metal ion impurities under various conditions. It is frequently used in the pharmaceutical industry for laboratory applications, particularly for adsorbing metals such as Pd(II), Cu, Ag, and Hg. Additionally, it can also adsorb other metals present in samples, such as Pb, Rh, Ru, and Sn. Below is a directory of metal removal capabilities for Welchrom® Thiol.

Scavenger	Ag	Cd	Cr	Co	Cu	Fe	Hg	Ni	Pb	Pd (II)	Pd (O)	Pt	Rh (I)	Rh (II)	Rh (III)	Ru (II)	Ru (IV)	Sn	V	Zn
Thiol	▼				▼		▼		▲	▼	▼		▼	▼	▲		▼	▲		

▼ Preferred scavengers ▲ scavengers

Ordering information of Welchrom® Thiol

P/N	Description
00575-11040	Welchrom Thiol, 25g/bottle

Welchrom® Inorganic SPE

Welchrom® Inorganic SPE Adsorbents are commonly used as normal-phase polar adsorbents. Their polarities and surface acidities vary, which leads to different applications, but they are generally used for sample purification before analysis, especially for purifying organic extracts from complex samples. For example, Florisil PR adsorbents are frequently used to purify organic solvent extracts from plant and animal tissues, particularly in pesticide residue analysis. These adsorbents are also used for sample pretreatment in detecting Sudan dyes and malachite green in food products.
Welchrom® Inorganic adsorbents are activated under strictly controlled conditions, ensuring effective purification with high and consistent recovery rates and excellent reproducibility.

1. Welchrom® Florisil PR

Welchrom® Florisil PR is a high-selectivity synthetic adsorbent composed of silica, magnesium oxide, and sodium sulfate. It is commonly used for sample purification and the extraction and separation of chlorinated pesticides before chromatographic analysis. Additionally, it is used for the extraction and separation of PCBs (polychlorinated biphenyls) and PAHs (polycyclic aromatic hydrocarbons).

Technical parameters

Matrix	Magnesium silicate
Parameter	60-100 mesh (150-250 µm)
Function groups	Silicon hydroxyl
Retention mechanism	Normal phase retention

Application

Analysis of environmental samples and pesticide residues, such as pyrethroid pesticide residues in eggs, detection of PAHs in water and food.

Ordering information of Welchrom® Florisil PR

P/N	Description	P/N	Description
00516-20001	Welchrom® Florisil PR, 100 mg/1 ml, 100 pk	00516-20006	Welchrom® Florisil PR, 500 mg/6 ml, 30 pk
00516-20002	Welchrom® Florisil PR, 100 mg/3 ml, 50 pk	00516-20007	Welchrom® Florisil PR, 1 g/6 ml, 30 pk
00516-20003	Welchrom® Florisil PR, 150 mg/3 ml, 50 pk	00516-20075	Welchrom® Florisil PR, 1 g/12 ml, 20 pk
00516-20004	Welchrom® Florisil PR, 200 mg/3 ml, 50 pk	00516-20008	Welchrom® Florisil PR, 4 g/12 ml, 20 pk
00516-20005	Welchrom® Florisil PR, 500 mg/3 ml, 50 pk	00516-20095	Welchrom® Florisil PR, 1000 mg/6 ml, 30 pk, glass
00516-20035	Welchrom® Florisil PR, 5 g/30 m, 10 pk	09516-20007	Welchrom® Florisil PR, 1 g/12 ml, 20 pk

2. Welchrom® Alumina-N

Welchrom® Alumina-N is a neutral alumina-based strong polar SPE adsorbent. The surface treatment renders it neutral, allowing it to interact with aluminum metal centers and form hydrogen bonds with surface silanol groups or perform ionic exchange with charged surfaces. It has a strong retention capacity for nitrogen, phosphorus, and sulfur-containing heterocyclic compounds, aromatic hydrocarbons, and organic amines. It is widely used for sample preparation in the analysis of Sudan dyes and malachite green.

Technical parameters

Matrix	Al_2O_3 particle
Parameter	Particle size: 50-200 µm
Function groups	Aluminum hydroxyl
pH	7.5
Retention mechanism	Normal phase retention or anion exchange

Application

Separation of polar or non-polar compounds from water-soluble and water-insoluble samples, or detection of food additives in beverages, such as lutein and acesulfame potassium, etc.

Ordering information of Welchrom® Alumina-N

P/N	Description	P/N	Description
00518-20001	Welchrom® Alumina-N, 100 mg/1 ml, 100 pk	00518-20013	Welchrom® Alumina-N, 250 mg/6 ml, 30 pk
00518-20002	Welchrom® Alumina-N, 100 mg/3 ml, 50 pk	00518-20006	Welchrom® Alumina-N, 500 mg/6 ml, 30 pk
00518-20003	Welchrom® Alumina-N, 150 mg/3 ml, 50 pk	00518-20007	Welchrom® Alumina-N, 1 g/6 ml, 30 pk
00518-20004	Welchrom® Alumina-N, 200 mg/3 ml, 50 pk	00518-20036	Welchrom® Alumina-N, 2 g/6 ml, 30 pk
00518-20066	Welchrom® Alumina-N, 300 mg/3 ml, 50 pk	00518-20075	Welchrom® Alumina-N, 1 g/12 ml, 20 pk
00518-20049	Welchrom® Alumina-N, 400 mg/3 ml, 50pk	00518-20008	Welchrom® Alumina-N, 2 g/12 ml, 20 pk
00518-20005	Welchrom® Alumina-N, 500 mg/3 ml, 50 pk	00518-20095	Welchrom® Alumina-N, 4 g/12 ml, 20 pk
00518-20068	Welchrom® Alumina-N, 1000 mg/3 ml, 50 pk	00518-20074	Welchrom® Alumina-N, 5 g/12 ml, 20 pk
00518-20014	Welchrom® Alumina-N, 200 mg/6 ml, 30 pk	00518-20035	Welchrom® Alumina-N, 5 g/30 ml, 10 pk
00518-20037	Welchrom® Alumina-N, 22 g/60 ml, 10 pk	09518-20036	Welchrom® Alumina-N, 2 g/6 ml, 30 pk, glass

3. Welchrom® Alumina-B

Welchrom® Alumina-B is an alkaline alumina SPE adsorbent produced by treating alumina filler with an alkaline solution. The surface is negatively charged, providing functionality similar to cation exchange. The particle size of Welchrom® Alumina-B ranges from 50 to 200 µm.

Technical parameters

Matrix	Al_2O_3 particle
Parameter	Particle size: 50-200 μm
Function groups	Aluminum hydroxyl
pH	10.0
Retention mechanism	Normal phase retention or cation exchange

Application

Retention of polar compounds, cationic compounds and neutral amine samples. Detection of sulfonamides in feed.

Ordering information of Welchrom® Alumina-B

P/N	Description	P/N	Description
00520-20001	Welchrom® Alumina-B, 100 mg/1 ml, 100 pk	00520-20068	Welchrom® Alumina-B, 1000 mg/3 ml, 50 pk
00520-20002	Welchrom® Alumina-B, 100 mg/3 ml, 50 pk	00520-20014	Welchrom® Alumina-B, 200 mg/6 ml, 30 pk
00520-20003	Welchrom® Alumina-B, 150 mg/3 ml, 50 pk	00520-20006	Welchrom® Alumina-B, 500 mg/6 ml, 30 pk
00520-20004	Welchrom® Alumina-B, 200 mg/3 ml, 50 pk	00520-20007	Welchrom® Alumina-B, 1000 mg/6 ml, 30 pk
00520-20005	Welchrom® Alumina-B, 500 mg/3 ml, 50 pk	00520-20075	Welchrom® Alumina-B, 1 g/12 ml, 20 pk
00520-20008	Welchrom® Alumina-B, 2 g/12 ml, 20 pk		

4. Welchrom® Alumina-A

Welchrom® Alumina-A is an acidified alumina solid-phase extraction adsorbent with a surface pH of 4.5. The particle size ranges from 50 to 200 μm. It functions as a strong polar adsorbent and a moderate anion exchanger.

Application

Separation and purification of acid, moderate polarity and polar target compounds.

Ordering information of Welchrom® Alumina-A

P/N	Description	P/N	Description
00519-20001	Welchrom® Alumina-A, 100 mg/1 ml, 100 pk	00519-20005	Welchrom® Alumina-A, 500 mg/3 ml, 50 pk
00519-20002	Welchrom® Alumina-A, 100 mg/3 ml, 50 pk	00519-20068	Welchrom® Alumina-A, 1000 mg/3 ml, 50 pk
00519-20003	Welchrom® Alumina-A, 150mg/3 ml, 50 pk	00519-20014	Welchrom® Alumina-A, 200 mg/6 ml, 30 pk
00519-20004	Welchrom® Alumina-A, 200 mg/3 ml, 50 pk	00519-20006	Welchrom® Alumina-A, 500 mg/6 ml, 30 pk
00519-20007	Welchrom® Alumina-A, 1000 mg/6 ml, 30 pk		

5. Welchrom® Na_2SO_4

Welchrom® Na_2SO_4 is a high-purity anhydrous sodium sulfate used as a drying agent to effectively remove moisture interference from samples. It offers superior cleanliness and dehydration performance compared to analytical-grade anhydrous sodium sulfate.

Ordering information of Welchrom® Na_2SO_4

P/N	Description	P/N	Description
00551-20005	Welchrom® Na_2SO_4, 500 mg/3 ml, 50 pk	00551-20018	Welchrom® Na_2SO_4, 100 g/bottle
00551-20007	Welchrom® Na_2SO_4, 1 g/6 ml, 30 pk	00551-20024	Welchrom® Na_2SO_4, 500 g/bottle
00551-20131	Welchrom® Na_2SO_4, 6 g/12 ml, 20 pk		

5. Welchrom® GraphiCarb

Welchrom® Graphicarb addresses the limitations of activated carbon, such as difficulty in eluting extracted substances, while retaining high affinity and large adsorption capacity for both polar and non-polar organic compounds. This results in excellent purification efficiency, high recovery rates, and high reproducibility. It is widely used in pesticide residue analysis and the preprocessing of samples with high pigment content. Additionally, unlike porous materials, graphitized carbon black achieves adsorption equilibrium quickly, saving sample processing time.

Technical parameters

Matrix	Graphite
Function groups	Carbon six-member ring
Retention mechanism	Surface adsorption retention

Application

Detection of moderate and nonpolar target compounds and aromatic ring compounds.

Ordering information of Welchrom® GraphiCarb

P/N	Description	P/N	Description
00517-20001	Welchrom® Carb, 100 mg/1 ml, 100 pk	00517-20012	Welchrom® Carb, 250 mg/3 ml, 50 pk
00517-20002	Welchrom® Carb, 100 mg/3 ml, 50 pk	00517-20005	Welchrom® Carb, 500 mg/3 ml, 50 pk
00517-20003	Welchrom® Carb, 150 mg/3 ml, 50 pk	00517-20013	Welchrom® Carb, 250 mg/6 ml, 30 pk
00517-20004	Welchrom® Carb, 200 mg/3 ml, 50pk	00517-20006	Welchrom® Carb, 500 mg/6 ml, 30 pk
00517-20007	Welchrom® Carb, 1000 mg/6 ml, 30 pk		

7. Welchrom® Acticarbon

Welchrom® Acticarbon activated carbon column can be used for the detection of nitrosamine and acrylamide in water.

Ordering information of Welchrom® Acticarbon

P/N	Description	P/N	Description
00582-20001	Welchrom® Acticarbon, 100 mg/1 ml, 100 pk	00582-20013	Welchrom® Acticarbon, 250 mg/6 ml, 30 pk
00582-20004	Welchrom® Acticarbon, 200 mg/3 ml, 50 pk	00582-20043	Welchrom® Acticarbon, 150 mg/6 ml, 30 pk
00582-20006	Welchrom® Acticarbon, 500 mg/6 ml, 30 pk	00582-20075	Welchrom® Acticarbon, 1 g/12 ml, 20 pk
00582-20008	Welchrom® Acticarbon, 2 g/12 ml, 20 pk	00582-20017	Welchrom® Acticarbon, 10 g/bottle
00582-20012	Welchrom® Acticarbon, 250 mg/3 ml, 50 pk	00582-20018	Welchrom® Acticarbon, 100 g/bottle

8. Welchrom® Celite AZO

Welchrom® Celite AZO utilizes diatomite filler processed with a special technique. The diatomite in Welchrom® Celite AZO is treated with a high-temperature activation process, resulting in a large specific surface area and extremely low surface activity. This ensures an exceptionally high recovery rate for aromatic amine target compounds. AZO dyes are the most widely used synthetic dyes in the textile industry during the dyeing and printing process. A small number of AZO dyes varieties may generate carcinogenic aromatic amines upon decomposition through chemical reactions. The diatomite filler is soft and lightweight, with a SiO_2 content exceeding 70%, making it suitable for the pretreatment of AZO dyes in compliance with GB/T 17592-2011 "Textiles - Determination of the Banned AZO Colourants."

Technical parameters

Matrix	Porous silica
Specifications	Particle size: 100 mesh Average pore size: 100 mesh
Function groups	Silanol
Retention mechanism	Normal-phase retention

Application

For target compounds of moderate polarity and polarity.

Ordering information of Welchrom® Celite AZO

P/N	Description	P/N	Description
00567-20001	Welchrom® Celite AZO, 100 mg/1mL, 100 pk	00567-20128	Welchrom® Celite AZO, 2 g/30mL, 10 pk
00567-20006	Welchrom® Celite AZO, 500 mg/6mL, 30 pk	00567-20085	Welchrom® Celite AZO, 4 g/30mL, 10 pk
00567-20007	Welchrom® Celite AZO, 1 g/6mL, 30 pk	00567-20035	Welchrom® Celite AZO, 5 g/30mL, 10 pk
00567-20136	Welchrom® Celite AZO, 400 mg/12mL, 20 pk	00567-20118	Welchrom® Celite AZO, 1.5 g/60mL, 10 pk
00567-20111	Welchrom® Celite AZO, 1.5 g/12mL, 20 pk	00567-20130	Welchrom® Celite AZO, 2 g/60mL, 10 pk
00567-20008	Welchrom® Celite AZO, 2 g/12mL, 20 pk	00567-20042	Welchrom® Celite AZO, 5 g/60mL, 10 pk
00567-20100	Welchrom® Celite AZO, 3 g/12mL, 20 pk	00567-20041	Welchrom® Celite AZO, 10 g/60mL, 10 pk
00567-20074	Welchrom® Celite AZO, 5 g/12mL, 20 pk	00567-20089	Welchrom® Celite AZO, 14.5 g/60mL, 10 pk
00567-20121	Welchrom® Celite AZO, 1.5 g/30mL, 10 pk	00567-20134	Welchrom® Celite AZO, 15 g/60mL, 10 pk
00567-20171	Welchrom® Celite AZO, 250mg/1ml, 100 pk	00567-20005	Welchrom® Celite AZO, 500mg/3ml, 50 pk
00567-20172	Welchrom® Celite AZO, 4.5g/30mL, 10 pk	00567-20173	Welchrom® Celite AZO, 8.3g/60mL, 10 pk

Welchrom® Mixed Mode SPE

Welchrom® Mixed Mode SPE combine two types of stationary phases to utilize various interfacial effects for separating and purifying analytes. They are particularly useful for extracting basic drugs from biological matrices and analyzing pesticide residues in biological matrices, where numerous interfering substances are present and difficult to wash away. These mixed adsorbents are designed to handle complex sample matrices effectively.

1. Welchrom® C8/SCX

Welchrom® C8/SCX Mixed Mode SPE Product combines a C8 alkyl stationary phase and a strong cation exchange stationary phase SCX on a silica matrix in an optimized ratio. This dual-phase composition provides a combined retention mechanism. The C8 phase interacts with the hydrophobic parts of analytes, while the SCX phase interacts with the protonated amino groups of the analytes. Due to the strong dual interactions between the adsorbent and the analytes, it allows the use of stronger washing solvents and conditions to remove interfering substances adsorbed on the adsorbent.

Technical parameters

Matrix	Silica gel
Function groups	C8 alkyl chain, sulfonic acid group
Retention mechanism	Mixed mode of reversed-phase retention and cation exchange retention

Application

Detection of cationic target compounds, such as melamine, clenbuterol, etc.

Ordering information of Welchrom® C8/SCX

P/N	Description	P/N	Description
00556-11001	Welchrom® C8/SCX, 100 mg/1 ml, 100 pk	00556-11005	Welchrom® C8/SCX, 500 mg/3 ml, 50 pk
00556-11002	Welchrom® C8/SCX, 100 mg/3 ml, 50 pk	00556-11014	Welchrom® C8/SCX, 200 mg/6 ml, 30 pk
00556-11003	Welchrom® C8/SCX, 150 mg/3 ml, 50 pk	00556-11006	Welchrom® C8/SCX, 500 mg/6 ml, 30 pk
00556-11004	Welchrom® C8/SCX, 200 mg/3 ml, 50 pk	00556-11007	Welchrom® C8/SCX, 1 g/6 ml, 30 pk

2. Welchrom® GraphiCarb/NH_2

Welchrom® GraphiCarb/NH_2 consists of an equal mix of graphitized carbon black and aminopropyl-bonded silica gel. This combination provides unique separation and extraction capabilities, especially effective in pesticide residue analysis. It is particularly suited for removing pigments, fatty acids, and phenolic compounds, as well as extracting organophosphates from tea. This makes it ideal for preprocessing and analysis of pesticide residues in food and plant samples.

Technical parameters

Matrix	Silica gel, graphitized carbon
Function groups	Carbon six-member ring, aminopropyl group
Retention mechanism	Mixed mode of reversed-phase retention and cation exchange retention

Application

Purification of samples in agricultural residue detection.

Ordering information of Welchrom® Carb/NH_2

P/N	Description	P/N	Description
00527-20010	Welchrom® Carb/NH_2, 250 mg/250 mg/6 ml, 30 pk	00527-20091	Welchrom® Carb/NH_2, 500 mg/1 g/6 ml, 30 pk
00527-20011	Welchrom® Carb/NH_2, 500 mg/500 mg/6 ml, 30 pk	00527-20008	Welchrom® Carb/NH_2, 1 g/1 g/12 ml, 20 pk
00527-20072	Welchrom® Carb/NH_2, 300 mg/500 mg/6 ml, 30 pk		

3. Welchrom® SAX/PSA

Welchrom® SAX/PSA is composed of two layers: the upper layer contains an equal amount of SAX (Strong Anion Exchange) material, and the lower layer contains an equal amount of PSA (Primary and Secondary Amine) material. The upper SAX layer adsorbs acidic substances from the sample matrix, while the lower PSA layer adsorbs organic acids, fatty acids, pigments, and other interfering substances. This dual-layer configuration is widely used for analyzing multiple pesticide residues in food.

Technical parameters

Matrix	Silica gel
Function groups	Quaternary ammonium group, ethylenediamine group
Retention mechanism	Mixed mode of normal phase retention and anion exchange retention

Application

Purification of samples in agricultural residue testing detection.

Ordering information of Welchrom® SAX/PSA

P/N	Description
00569-11011	Welchrom® SAX/PSA, 500 mg/500 mg/6 ml, 30 pk

4. Welchrom® GraphiCarb/PSA

Welchrom® GraphiCarb/PSA is a mixed-layer SPE product composed of an equal amount of graphitized carbon black in the upper layer and PSA (Primary and Secondary Amine) in the lower layer. The upper graphitized carbon black layer is effective at adsorbing pigments present in the sample matrix, while the lower PSA layer adsorbs organic acids, fatty acids, pigments, and other interfering substances. This dual-layer configuration is widely used for analyzing multiple pesticide residues in food.

Technical parameters

Matrix	Graphitized carbon black
Function groups	Carbon six-member ring, ethylenediamine group
Retention mechanism	Mixed mode of normal phase retention and surface adsorption

Application

Purification of samples in agricultural residue detection.

Ordering information of Welchrom® SAX/PSA

P/N	Description
00548-20011	Welchrom® GraphiCarb/PSA, 500 mg/500 mg/6 ml, 30 pk

5. Welchrom® C18/CN

Welchrom® C18/CN columns are prepared by packing C18 and CN in specific proportions. They are suitable for the determination of four nitrofuran metabolites in seafood, including:1-Amino-2-oxazolidinone (AHD), 5-Methylmorpholine-3-amino-2-oxazolidinone (AMOZ), 3-Amino-2-oxazolidinone (AOZ), Furazolidone metabolite amino-urea (SEM).

Application

Determination of nitrofuran metabolites residues in aquatic products by HPLC method.

Ordering information of Welchrom® C18/CN

P/N	Description
00555-11004	Welchrom® C18/CN, 200mg/3ml, 50pk
00555-11049	Welchrom® C18/CN, 400mg/3ml, 50pk
00555-11071	Welchrom® C18/CN, 600mg/6ml, 30pk

Welchrom® Special SPE

Welchrom® special SPE column adsorbents include benzopyrene column, Sudan red column, plasticiser column, tea column and Chinese herbal medicine column.

1. Welchrom® BAP (benzopyrene)

Welchrom® BaP is a solid-phase extraction column developed according to the national standard GB/T 22509-2008 for the determination of benzo(a)pyrene in animal and plant fats and oils. This purification column utilizes a normal-phase retention mechanism to retain interfering substances in the oil while allowing the target compound, benzo(a)pyrene, to flow out with the solvent. This effectively separates benzo(a)pyrene from matrix interferences such as neutral fats and vitamins in edible oils. The column offers stable recovery rates, reproducibility, and a simple, rapid method, making it an excellent choice for benzo(a)pyrene analysis.

Technical parameters

Matrix	Neutral Al_2O_3
Function groups	Aluminum hydroxy
Retention mechanism	Normal phase retention

Application

Detection of benzopyrene in animal and vegetable oil.

Ordering information of Welchrom® Bap

P/N	Description
00547-20037	Welchrom® BaP, 22 g/60 ml, 10 pk

2. Welchrom® BAP-2 (benzopyrene molecular imprinted)

Welchrom® BaP-2 is a solid-phase extraction column designed for extracting benzo(a)pyrene from oily samples. The method involves using dichloromethane for elution and represents a new approach for detecting benzo(a)pyrene in fats. Compared to the national standard GB/T 22509-2008, this method offers better removal of fats, more stable recovery rates for benzo(a)pyrene, and reduced solvent usage, making it more environmentally friendly and simpler to perform.

Ordering information of Welchrom® Bap

P/N	Description
00594-20006	Welchrom® BaP-2, 500 mg/6ml, 30 pk

3. Welchrom® Special Column for Plasticizer

Welchrom® Special Column for Plasticizer is divided into two types: W-PTC and O-PTC. W-PTC column is mainly used to extract phthalate ester targets from polar solvents and liquor. O-PTC column is mainly used to extract phthalate targets from non-polar solvents.

Technical parameters of W-PTC column

Matrix	Polymer
Retention mechanism	Reversed- phase retention

Application

Determination of plasticizer in polar solvent.

Technical parameters of O-PTC column

Matrix	Polymer
Retention mechanism	Reversed- phase retention

Application

Determination of plasticizer in nonpolar solvent.

Ordering information of Welchrom® Special Column for Plasticizer

P/N	Description
09566-11011	O-PTC (oil), 500/500/6 ml, 30 pk
09566-20007	W-PTC (water), 1 g/6 ml, 30 pk

4. Welchrom® TPT (special for tea leaf)

Welchrom® TPT is a specialized pre-treatment purification column developed by Welch for pesticide residue analysis in tea. The column is designed to remove major interfering substances that affect pesticide residue detection in tea. The column bed is composed of three types of adsorbents, allowing for the multi-residue detection of various pesticides in tea, including organo-phosphates, organochlorines, carbamates, and pyrethroids.

Ordering information of Welchrom® PTP

P/N	Description
00545-20011	Welchrom® TPT, 1000 mg/6 ml, 30 pk
00545-20061	Welchrom® TPT, 2 g/12 ml, 20 pk

5. Welchrom® CTD (special for Chinese herbal medicine)

Welchrom® CTD (Specialized for Traditional Chinese Medicine) is a solid-phase extraction column where the packing material is layered with three components, A, B, and C, in a specific ratio. The column is designed to remove pigments, acidic contaminants, sugars, and lipid-soluble impurities from traditional Chinese medicine while avoiding the adsorption of target pesticides.

Ordering information of Welchrom® CTD

P/N	Description
00568-20007	Welchrom® CTD, 1 g/6 ml, 30 pk
00568-20008	Welchrom® CTD, 2 g/12 ml, 20 pk

6. Welchrom® SDD(Special for Sudan Red)

Welchrom® Sudan Red Special Column is designed based on the GB/T 19681-2005 national standard method for determining Sudan dye in foods. This purification column uses a normal-phase retention mechanism to effectively remove fats, organic acids, and vitamins from edible oils, making it an optimal choice for analyzing Sudan dye in food products.

Technical parameters

Matrix	Neutral alumina
Function groups	Aluminum hydroxy
Retention mechanism	Normal phase retention

Application

Sundan Red

Ordering information of Welchrom® SDD

P/N	Description
00566-20006	Welchrom® SDD, 500 mg/6 ml, 30 pk
00566-20095	Welchrom® SDD, 4 g/12 ml, 20 pk
00566-20008	Welchrom® SDD, 2 g/12 ml, 20 pk

7. Welchrom® SDH

Welchrom® SDH Sudan Red Special Column, with a specification of 500 mg/6 mL, is designed for the rapid and efficient detection of four types of Sudan Red dyes in chili oil, chili sauce, and chili powder. This column offers high sensitivity and excellent reproducibility, overcoming many issues found in the GB/T 19681-2005 method, such as complex sample preparation, instability, and poor reproducibility.

Ordering information of Welchrom® SDH

P/N	Description
00599-20006	Welchrom® SDH, 500 mg/6 ml, 30 pk

8. Welchrom® SDH-2

Welchrom® SDH-2 Sudan Red Special Column (Part No. 00599-20011, specification 500mg/500mg/6mL, 15pk) is divided into two sections: the upper part, Column 1, is designed for removing fats, while the lower part, Column 2, adsorbs and retains Sudan Red dyes. This column is particularly suited for detecting four types of Sudan Red in high-fat matrices like chili oil, chili sauce, and chili powder. It offers high sensitivity and excellent reproducibility, overcoming the cumbersome and unstable pretreatment methods and reproducibility issues of the GB/T 19681-2005 method.

Ordering information of Welchrom® SDH-2

P/N	Description
00599-20011	Welchrom® SDH-2, 500 mg/500 mg/6 ml, 15 pk

9. Welchrom® Vitamin K1

Welchrom® Vitamin K1 Pretreatment Column is specifically designed to effectively remove chlorophyll and other interfering impurities from crude extracts of vitamin K1 in low-fat plant samples such as fruits and vegetables. It is suitable for use with the GB 5009.158-2016 method.

Application

Determination of vitamin K1 in food

Ordering information of Welchrom® Vitamin K1

P/N	Description
00573-20036	Welchrom® Vitamin K1, 2 g/6 ml, 30 pk

10. Welchrom® HON

Welchrom® HON Honey-Specific Column is designed for the detection of oligosaccharides in honey, as specified in Part I of the 2020 edition of the Chinese Pharmacopoeia. The column, filled with activated carbon and diatomaceous earth, effectively enriches high molecular weight sugars in honey for subsequent separation and analysis.

Application

China Pharmacopoeia 2020 edition of honey detection item - oligosaccharide

Ordering information of Welchrom® HON

P/N	Description
00593-20113	Welchrom® HON, 500 mg/12 ml, 20 pk

11. Welchrom® $AgNO_3$-Silica Column

Welchrom® ANO-Silica Column, developed by Welch based on the SN/T4895-2017 standard method, offers a simple operation with effective purification and reduced reagent consumption. This column achieves the separation of MOSH (Mineral Oil Saturated Hydrocarbons) and MOAH (Mineral Oil Aromatic Hydrocarbons), improving lab efficiency by eliminating the need for preparing silver nitrate silica columns, thus streamlining the workflow.

Application

SN/T 4895-2017 Determination of Mineral Oil in Food Simulants for Paper and Board Food Contact Materials – Gas Chromatography Method

Ordering information of Welchrom® $AgNO_3$-Silica Column

P/N	Description
005PM-131-20	Welchrom® $AgNO_3$-Silica, 3g/12mL, 20pk

12. Welchrom® PA Polyamide Column

Welch has developed the Welchrom® PA Polyamide Column according to the GB 5009.35-2016 standard method. It is suitable for the determination of six colorants in food, including Tartrazine, Ponceau 4R, Amaranth, Carmine, Sunset Yellow, and Brilliant Blue. This column has been thoroughly validated using liquid chromatography and meets the detection requirements under standard conditions, ensuring accuracy and reliability of the results.

Application

GB 5009.35-2016 National Food Safety Standard - Determination of Synthetic Colorants in Food

Ordering information of Welchrom® PA Polyamide

P/N	Description
00541-20007	Welchrom® PA, 1000mg/6mL, 30pk

13. Welchrom® DNPH and Welchrom® KI

Welch's Welchrom® DNPH Column is suitable for the HJ/T 400-2007 method for sampling and determining volatile organic compounds and aldehydes/ketones in vehicle interiors, as well as the HJ 683-2014 method for the determination of aldehydes and ketones in ambient air using high-performance liquid chromatography. The column uses 2,4-dinitrophenylhydrazine (DNPH) coated silica gel under acidic conditions to absorb aldehydes and ketones, a reaction that is highly specific. When used with the Welchrom® KI Ozone Removal Column, it can be applied for the sampling and analysis of 14 types of aldehydes and ketones in both vehicle interiors and environmental air.

Application

HJ 683-2014 Determination of Aldehydes and Ketones in Ambient Air by High-Performance Liquid Chromatography
HJ/T 400-2007 Method for Sampling and Determination of Volatile Organic Compounds and Aldehydes/Ketones in Vehicle Interiors

Ordering information of Welchrom® DNPH and Welchrom® KI

P/N	Description	P/N	Description
005PM-067-20	Welchrom® DNPH, 350 mg/3 ml, 20 pk	005PM-072-20	Welchrom® KI, 1000 mg/3 ml, 20 pk
005PM-067-50	Welchrom® DNPH, 350 mg/3 ml, 50 pk	005PM-072-50	Welchrom® KI, 1000 mg/3 ml, 50 pk
005PM-070-20	Welchrom® DNPH, 1000 mg/6 ml, 20 pk	005PM-073-20	Welchrom® KI, 1500 mg/6 ml, 20 pk
005PM-075-20	Welchrom® DNPH-II, 200 mg/1 ml, 20 pk	005PM-076-20	Welchrom® KI-II, 1 g/1 ml, 20 pk

14. Welchrom® MOPD C18

Welchrom® MOPD C18 is suitable for the pre-treatment method for the determination of morphine content in Compound Liquorice Oral Solution and Compound Liquorice Tablets as per the 2020 edition of the Chinese Pharmacopoeia. The method has been fully validated using liquid chromatography, and under standard conditions, it meets all detection requirements.

Application

Determination of Morphine Content in Compound Liquorice Oral Solution and Compound Liquorice Tablets - 2020 Edition of the Chinese Pharmacopoeia

Ordering information of Welchrom® MOPD C18

P/N	Description
005PM-136-50	Welchrom® MOPD C18, 200mg/3mL, 50pk

15. Welchrom® HepAC Heparin Affinity Column

The Welchrom® HepAC Heparin Affinity Column is designed according to the "National Food Safety Standard - Determination of Lactoferrin in Food (Draft for Comment)." It is suitable for the determination of bovine lactoferrin content in a wide range of products, including pasteurized milk, modified milk, milk-containing beverages, and milk-based infant formula foods. This method is fast, simple to operate, highly accurate, and plays a crucial role in improving food quality and safety.

Application

Determination of Bovine Lactoferrin Content in Pasteurized Milk, Modified Milk, Milk-Containing Beverages, and Milk-Based Infant Formula Foods

Ordering information of Welchrom® HepAC Heparin Affinity Column

P/N	Description
005PM-153-20	Welchrom® HepAC, 1mL, 20pk

16. Welchrom® Protein G HP Affinity Column

The Welchrom® Protein G HP Affinity Column is suitable for the determination of immunoglobulin IgG in milk and dairy products. The Welchrom® Protein G HP Affinity Column specifically adsorbs immunoglobulin G (IgG). The IgG in the sample is extracted with phosphate buffer and then purified using the Welchrom® Protein G HP Affinity Column. The purified sample solution can be directly used for HPLC analysis. The combination of the Welchrom® Protein G HP Affinity Column with HPLC enables rapid determination, improves the signal-to-noise ratio, and enhances the accuracy of the detection.

Application

T/SSFS 0002-2021 Determination of Immunoglobulin IgG in Milk and Dairy Products (High-Performance Liquid Chromatography Method)

Ordering information of Welchrom® Protein G HP Affinity Column

P/N	Description
00081-12032	Welchrom® Protein G HP Affinity Column, 1mL, 10pk

17. Welchrom® Multi-Function Purification Column

Welchrom® 226 and 228 Multi-Function Purification Columns are part of Welch's series of specialized pre-treatment columns, designed for the determination of patulin content in food. The Welchrom® 226 and 228 Multi-Function Purification Columns offer one-step purification, which is simple and quick, completing the purification of mycotoxins within 30 seconds. The purification efficiency ensures a recovery rate of ≥90% with repeatability RSD ≤5%.

Application

Welchrom® 226 Multi-Function Purification Column is suitable for the determination of aflatoxin B and G groups in food products such as vegetable oil, soybeans, sunflower seeds, fermented black soybeans, soy sauce, and for the determination of zearalenone content in vegetable oil, rice, soy sauce, vinegar, soybeans, and foods like Lao Gan Ma.
Welchrom® 228 Multi-Function Purification Column is suitable for the determination of aflatoxin B and G groups in vegetable oil, soybeans, fermented black soybeans, soy sauce, sunflower seeds, and for the determination of patulin content in foods like hawthorn juice, hawthorn slices, and apples.

Ordering information of Welchrom® Multi-Function Purification Column

P/N	Name	Description	Specification
01150-01001	Welchrom® 226 Multi-Function Purification Column	Zearalenone, Aflatoxin B1, B2, G1, G2	25 pk/box
01150-02001	Welchrom® 228 Multi-Function Purification Column	Patulin, Aflatoxin B1, B2, G1, G2	25 pk/box

18. Specialized Sample Pre-treatment Kit for HPLC Detection of Benzo(α)pyrene in Edible Oils and Fats

The specialized sample pre-treatment kit for HPLC detection of benzo(α)pyrene in edible oils and fats offers simple and rapid operation with high pre-treatment efficiency. It allows for the simultaneous pre-treatment of multiple samples with a fast flow rate through the column. The inter-batch differences are minimal, typically eliminating the need for quality control validation experiments for each batch. The kit provides high and stable recovery rates, generally between 80%-100%, with repeatability RSD <5%. It also offers excellent purification, effectively removing fats and reducing interference in the detection process.

Application

This method package uses solid-phase extraction (SPE) technology to perform the pre-treatment of samples for the separation, extraction, and purification of benzo(α)pyrene in liquid or solid edible oils and fats before determining its content using HPLC.

Ordering Information of Specialized Sample Pre-treatment Kit for HPLC Detection of Benzo(α)pyrene in Edible Oils and Fats

P/N	Name	Specification
BAP-P01	Specialized Sample Pre-treatment Kit for HPLC Detection of Benzo(α)pyrene in Edible Oils and Fats	25 reactions per set

19. Welchrom® PLR Phospholipid Removal Column

The phospholipid removal column plays a crucial role in the fields of food and biological sample analysis. It is primarily used to remove phospholipids from matrices, enhancing analytical sensitivity, stability, and precision. This column also reduces ion suppression and ion source contamination caused by phospholipids, thereby lowering instrument maintenance costs.

Application

It is suitable for the determination of tetracyclines, sulfonamides, and quinolones residues in the meat, liver, and kidney tissues of cattle, sheep, pigs, and chickens.

Ordering information of Welchrom® PLR Phospholipid Removal Column

P/N	Name	Specification
005PM-160-50	SPE Column	Welchrom® PLR, 200mg/3mL, 50pk
005PM-161-30	SPE Column	Welchrom® PLR, 200mg/6mL, 30pk
005PM-162-50	SPE Column	Welchrom® PLR, 300mg/3mL, 50pk
005PM-163-100	SPE Column	Welchrom® PLR, 200mg/6mL, 30pk

20. Welchrom® PBA Phenylboronic Acid Column

The Welchrom® PBA Phenylboronic Acid Column contains a phenylboronic acid functional group, which has a strong affinity for compounds containing cis-diol structures. It retains analytes through reversible covalent bonding. This covalent retention mechanism offers high selectivity and purification efficiency. It is highly specific for compounds with cis-diol groups, such as catechols, nucleic acids, low molecular weight proteins, and sugars.

Application

SN/T 4519-2016 Determination of Ribavirin Residues in Exported Animal-Derived Foods by Liquid Chromatography-Mass Spectrometry/Mass Spectrometry

Ordering information of Welchrom® PBA Phenylboronic Acid Column

P/N	Name	Specification
005PM-197-50	Welchrom® PBA Phenylboronic Acid column	100mg/3mL, 50pk

21. Welchrom® PPT 96-Well Protein Precipitation Plate

The Welchrom® PPT 96-Well Protein Precipitation Plate is a newly developed product by Welch, designed specifically for the pre-treatment of biological samples. The plate uses a specialized protein precipitation membrane that effectively retains common protein precipitants such as methanol and acetonitrile. Testing has shown that the solvent retention time exceeds 30 minutes.

Application

It is used for the removal of proteins from biological samples (whole blood, plasma, and serum) during drug analysis.

Ordering information of Welchrom® PPT 96-Well Protein Precipitation Plate

P/N	Name	Specification
005PM-193-1	Welchrom® PPT 96-Well Protein Precipitation Plate	96-Well, 2mL, 1/pk

Welchrom® Immunoaffinity Column

Welchrom® Immunoaffinity Column is used to separate and purify mycotoxins from samples based on specific reactions between antigens and antibodies. Antibodies in the immunoaffinity column suspend in the gel by covalent bonding and specifically adsorb the mycotoxin in the sample. If the sample being tested contains the mycotoxin, the toxin will be captured and bound by the antibody when the sample passes through the immunoaffinity column.
All other substances will be washed out of the immunoaffinity column. Methanol is used as an eluent to elute mycosins from the antibodies.

Welchrom® Immunoaffinity Column has features as follows

1. Selection of highly specific and high-affinity monoclonal antibodies ensures high-purity samples.
2. Large cartridge capacity with high antibody content increases sample adsorption and improves purification efficiency.
3. Allows purification of large volume samples, providing excellent concentration for low-concentration samples, thus effectively enhancing detection methods.
4. Products are validated by extensive scientific experiments, demonstrating good stability and reliability, with sample recovery rates of 90%-110%.
5. Highly versatile, suitable for various buffer systems without the need for complex or toxic reagents.
6. Simple and quick operation, with each sample taking only 10-15 minutes. Highly adaptable, requiring no specific experimental environment.
7. Purified samples are suitable for ELISA, HPLC, fluorescence photometry, and other methods.
8. Complies with national standards.

Application

Detection of mycotoxins in grains, peanuts, grain and oil products, alcoholic beverages, animal feed, traditional Chinese medicine, spices, and dairy products.

Relevant Standards:

- GB 5009.22-2016 National Food Safety Standard: Determination of Aflatoxin B and G in Food
- GB 5009.24-2016 National Food Safety Standard: Determination of Aflatoxin M in Food
- GB 5009.96-2016 National Food Safety Standard: Determination of Ochratoxin A in Food
- GB 5009.209-2016 National Food Safety Standard: Determination of Zearalenone in Food
- GB 5009.111-2016 National Food Safety Standard: Determination of Deoxynivalenol and its Acetylated Derivatives in Food
- GB 5009.118-2016 National Food Safety Standard: Determination of T-2 Toxin in Food

Ordering information

P/N	Product	Specification	Application Range
01140-00031	Total Aflatoxins (B1, B2, G1, G2)	1 ml, 25 pcs	Grain and oil, feed, Chinese medicine, condiments, etc
01140-00032	Total Aflatoxins (B1, B2, G1, G2)	3 ml, 15 pcs	
01140-00033	Total Aflatoxins (B1, B2, G1, G2)	3 ml, 30 pcs	
01140-01031	Total Aflatoxins (B1, B2, G1, G2, M1, M2)	1 ml, 25 pcs	Grain and oil, feed, Chinese medicinal materials, condiments, dairy products, etc
01140-01032	Total Aflatoxins (B1, B2, G1, G2, M1, M2)	3 ml, 15 pcs	
01140-05031	Aflatoxin B1	1 ml, 25 pcs	
01140-05032	Aflatoxin B1	3 ml, 15 pcs	
01140-03031	Aflatoxin M1	1 ml, 25 pcs	Dairy products
01140-03032	Aflatoxin M1	3 ml, 15 pcs	
01140-04031	Zearalenone (ZEN)	1 ml, 25 pcs	Grain, feed, condiments, etc
01140-04032	Zearalenone (ZEN)	3 ml, 15 pcs	
01140-02031	Vomiting Toxin (Deoxynivalenol, DON)	1 ml, 25 pcs	
01140-02032	Vomiting Toxin (Deoxynivalenol, DON)	3 ml, 15 pcs	
01140-16032	Vitamin B12 Immunoaffinity Column	3 ml, 15 pcs	Cereals, alcoholic beverages, animal feed, etc.
01140-07032	Fumonisin Immunoaffinity Column (FB1, FB2, FB3)	3 ml, 15 pcs	Grains, animal feed, etc.
01140-08032	T-2 Toxin Immunoaffinity Column	3 ml, 15 pcs	Grains, alcoholic beverages, spices, etc.

Ordering information of Welchrom® Multifunctional Immunoaffinity Column

P/N	Product	Specification	Product Description
01140-12032	OZ Dual-Action Immunoaffinity Column	3mL, 15 pcs	Ochratoxin A and Zearalenone Multifunctional Immunoaffinity Column
01140-13032	DZ Dual-Action Immunoaffinity	3 ml, 15 pcs	Deoxynivalenol and Zearalenone Multifunctional Immunoaffinity Column
01140-14032	AZ Dual-Action Immunoaffinity Column	3mL, 15 pcs	Six Aflatoxins and Zearalenone Multifunctional Immunoaffinity Column
01140-15032	AO Dual-Action Immunoaffinity Column	3mL, 15 pcs	Six Aflatoxins and Ochratoxin A Multifunctional Immunoaffinity Column
01140-11032	AOZ Triple-Action Immunoaffinity Column	3 ml, 15 pcs	Six Aflatoxins, Ochratoxin A, and Zearalenone Multifunctional Immunoaffinity Column
01140-10032	AODZ Quadruple-Action Immunoaffinity Column	3mL, 15 pcs	Aflatoxin B1, Ochratoxin A, Deoxynivalenol, and Zearalenone Multifunctional Immunoaffinity Column

SPE Manifold and Accessories

SPE manifold

Features

Equipped with a 20 μm pore size clean polyethylene frit, which fits various column sizes, custom products are also available upon request.

1. Vacuum glass chamber allows real-time monitoring of the extraction process and can undergo 121°C autoclave sterilization, making it easy to clean.
2. A vacuum gauge and exhaust valve are used to optimize sample flow rate.
3. Comes with multiple pore size support plates to fit most sample tubes, and a multi-position adjustable rack allows free adjustment of support plate height.
4. The bottom tray is specially designed to protect the glass vacuum chamber from wear.
5. Each channel is equipped with an imported adjustment valve, allowing the flow rate to be adjusted as per experimental requirements.

Technical parameters

Valves	≥12-channel independent valves
Glass vacuum chamber	Anti-fog glass vacuum chamber
Pressure	Glass vacuum chamber pressure resistance: ≤66 KPa
Dimension	195×100×170/mm (12 ports), 295×100×170/mm (24 ports)
Test tube size	Less than the standard 16 mm
Inlet pressure	<0.1 MP
Suitable for	Test tube/centrifuge tube/sample bottle, etc
Net weight	3.5 kg (12 ports), 6 kg (24 ports)
Relative humidity	<85% RH
Standard number of ports	Standard 12/24 ports

Device list



A. 12-port cover plate
B. Cover support rods: 4 units
C. Flow rate control valves (Stopcock): 12 or 24 units
D. Pressure vacuum gauge: 1 unit
E. Test tube rack positioning C-clips: 12 units
F. Waste liquid collection chamber: 1 unit
G. Flow needles: 12 or 24 units
H. Test tube rack: 9 or 7 pcs

Ordering information

P/N	Name	Specification	Application
00824-31001	SPE manifold	SPE manifold, 12 ports, 1 pk	Standard
00824-32001	SPE manifold	SPE manifold, 24 ports, 1 pk	Standard
00824-10001	SPE accessory	SPE cock (flow control), white valve,12pk	Optional
00824-20005 ×12	SPE accessory	SPE connector 12 pk	Optional

WEL-REX oil-free vacuum pump

The WEL-REX oil-free vacuum pump is mainly used in pharmaceutical analysis, fine chemicals, biopharmaceuticals, sanitary inspection, food and environmental testing, and academic research. It is an ideal product for use with chromatographic instruments and rotary evaporators both domestically and internationally. The pump offers several advantages, including: continuous operation in an oil-free state, compact size, low noise, high working efficiency, long service life, safe and reliable, economical and practical.

Main application

Vacuum filtration | Vacuum distillation | HPLC system | Compression and gas conversion

Solvent filtration | Vacuum drying | Rotary evaporators | Gel drying

Features

1. No Working Medium Required: Generates clean vacuum without any oil, ensuring no contamination. Utilizes new technologies and materials in production.
2. Portability and Convenience: Easy to carry and move with smooth operation. Employs oil-free lubrication and a piston structure, offering greater corrosion resistance and longer lifespan compared to ordinary diaphragm pumps.
3. Cooling and Ventilation System: Includes a designed cooling and ventilation system inside the pump body to ensure long-term continuous operation.
4. Adjustable Pressure Design: Allows for vacuum level and gas flow rate adjustments within a certain range.
5. Smooth Operation: Features imported bearings for smooth, noiseless operation and high efficiency with a long service life.
6. Unique Oil-Water Separator: Effectively prevents liquid from entering the pump body, extending the pump's lifespan and alleviating maintenance concerns.

Ordering information

P/N	Name	Specification	Application
WEL-REX-25A	Oil-free vacuum pump	25 L/min negative pressure	600 mm vacuum hose included
WEL-REX-40B	Oil-free vacuum pump	40 L/min negative pressure	600 mm vacuum hose included

Welchrom® IC Pretreatment Column

Overview:

During ion chromatography analysis, samples often contain metal ions or organic impurities. These impurities can interfere with the detection of target ions and also contaminate the ion chromatography column's packing material, reducing both the separation performance and lifespan of the column. Sample Preparation Columns for Ion Chromatography are developed based on solid-phase extraction principles. They use high-purity packing materials and leverage reverse adsorption and ion exchange mechanisms to effectively remove impurity ions and organic substances from the samples. This helps prevent contamination of the ion chromatography column and maintains its separation efficiency.

Ion chromatography pretreatment column: IC-H, IC-Ag, IC-Ag /H, IC-Ba, IC-Na, IC-RP, IC-C18, IC-Ag /Na, IC-Ba /Ag/H

Purification mode

(1) Impurity adsorption mode -- purification: In this mode, interfering components bind with the stationary phase, while the analytes pass through the column without being retained.
(2) Target adsorption mode -- enrichment + matrix elimination: In this mode, the analytes bind with the stationary phase, while interfering components pass through the column without retention. The analytes are then extracted using a suitable eluent.

Advantages

- Ion exchange capacity: 3.5-4.5 mmol/g, which is 1.3 times that of common products on the market.
- The column has a high loading capacity, ensuring more thorough impurity removal and can be reused multiple times depending on the specific sample conditions.
- The column body uses a unique bonding method, capable of withstanding high pressure to prevent cracking and leakage.
- The ion residue concentration in the IC pre-treatment column is extremely low, ensuring accurate detection.

Ordering information

P/N	Product	Functional group	Specification	Application
01150-10021	Welchrom® IC-H	Sulfonic Acid	IC-H, 1CC, 50/pk	Removal of cations (metal ions), adjustment of pH in sample solutions
01150-10022	Welchrom® IC-H	Sulfonic Acid	IC-H, 2.5CC, 50/pk	Removal of cations (metal ions), adjustment of pH in sample solutions
01150-10031	Welchrom® IC-Ag	Ag^+ Type Sulfonate	IC-Ag, 1cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, CrO_4^{2-}, PO_4^{3-}, etc.
01150-10032	Welchrom® IC-Ag	Ag^+ Type Sulfonate	IC-Ag, 2.5cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, CrO_4^{2-}, PO_4^{3-}, etc.
01150-10081	Welchrom® IC-Ag/H	Ag^+ Type Sulfonate + Sulfonic Acid	IC-Ag/H, 1cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, AsO_4^{3-}, CrO_4^{2-}, CN^-, MoO_4^{2-}, PO_4^{3-}, SeO_3^{2-}, SO_3^{2-}, S^{2-}, SCN^-, and free Ag^+ and heavy metal ions from sample solutions
01150-10082	Welchrom® IC-Ag/H	Ag^+ Type Sulfonate + Sulfonic Acid	IC-Ag/H, 2.5cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, AsO_4^{3-}, CrO_4^{2-}, CN^-, MoO_4^{2-}, PO_4^{3-}, SeO_3^{2-}, SO_3^{2-}, S^{2-}, SCN^-, and free Ag^+ and heavy metal ions from sample solutions
01150-10061	Welchrom® IC-Ba	Ba^{2+} Type Sulfonate	IC-Ba, 1cc, 50pcs/pk	Removal of SO_4^{2-} ions
01150-10062	Welchrom® IC-Ba	Ba^{2+} Type Sulfonate	IC-Ba, 2.5cc, 50pcs/pk	Removal of SO_4^{2-} ions
01150-10041	Welchrom® IC-Na	Na^+ Type Sulfonate	IC-Na, 1cc, 50pcs/pk	Removal of alkaline earth metals and transition metal ions
01150-10042	Welchrom® IC-Na	Na^+ Type Sulfonate	IC-Na, 2.5cc, 50pcs/pk	Removal of alkaline earth metals and transition metal ions
01150-10011	Welchrom® IC-RP	Styrene Divinylbenzene	IC-RP, 1cc, 50pcs/pk	Removal of hydrophobic compounds, pH range 1-14
01150-10012	Welchrom® IC-RP	Styrene Divinylbenzene	IC-RP, 2.5cc, 50pcs/pk	Removal of hydrophobic compounds, pH range 1-14
01150-10101	Welchrom® IC-C18	Octadecyl	IC-C18, 1cc, 50pcs/pk	Removal of hydrophobic compounds, pH range 2-8
01150-10102	Welchrom® IC-C18	Octadecyl	IC-C18, 2.5cc, 50pcs/pk	Removal of hydrophobic compounds, pH range 2-8
01150-10091	Welchrom® IC-Ag/Na	Ag^+ Type Sulfonate + Na^+ Type Sulfonate	IC-Ag/Na, 1cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, AsO_4^{3-}, CrO_4^{2-}, CN^-, MoO_4^{2-}, PO_4^{3-}, SeO_3^{2-}, SO_3^{2-}, S^{2-}, SCN^-, and free Ag^+ and heavy metal ions from sample solutions
01150-10092	Welchrom® IC-Ag/Na	Ag^+ Type Sulfonate + Na^+ Type Sulfonate	IC-Ag/Na, 2.5cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, AsO_4^{3-}, CrO_4^{2-}, CN^-, MoO_4^{2-}, PO_4^{3-}, SeO_3^{2-}, SO_3^{2-}, S^{2-}, SCN^-, and free Ag^+ and heavy metal ions from sample solutions
01150-10052	Welchrom® IC-Ba/Ag/H	Ba^{2+} Type Sulfonate + Ag^+ Type Sulfonate + Sulfonic Acid	IC-Ba/Ag/H, 2.5cc, 50pcs/pk	Removal of ions such as Cl^-, Br^-, I^-, AsO_4^{3-}, CrO_4^{2-}, CN^-, MoO_4^{2-}, PO_4^{3-}, SeO_3^{2-}, SO_3^{2-}, S^{2-}, SCN^-, and free Ag^+ and heavy metal ions from sample solutions

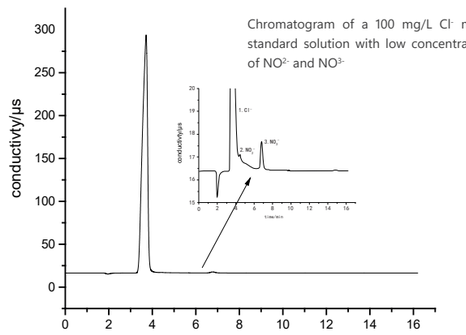
Pre-treatment Methods for Welchrom® IC Pre-treatment Columns

Column type	Specifications	Washing reagent	Volume of washing reagent (mL)	Maximum flow rate (mL/min)	Discarded effluent volume (mL)	Baseline detection
IC-RP	1CC	1.Methanol 2.Deionized water	Methanol 5 mL, deionized water 10 mL	2	3	When detecting low-concentration samples, after passing the above washing solvents through, use 2 mL of ultrapure water for blank measurement. If the baseline is too high, additional washing is required.
	2.5CC		Methanol 10 mL, deionized water 20 mL	2	6	
IC-H	1CC	Deionized water	10mL	2	3	
	2.5CC		20mL	2	6	
IC-Ag	1CC		10mL	2	3	
	2.5CC		20mL	2	6	
IC-Na	1CC		10mL	2	3	
	2.5CC		20mL	2	6	
IC-Ba	1CC		10mL	2	3	
	2.5CC		20mL	2	6	
IC-Ag/H	1CC		10mL	2	3	
	2.5CC		20mL	2	6	
IC-Ag/Na	1CC		10mL	2	3	
	2.5CC		20mL	2	6	
IC-Ba/Ag/H	2.5CC		20mL	2	6	

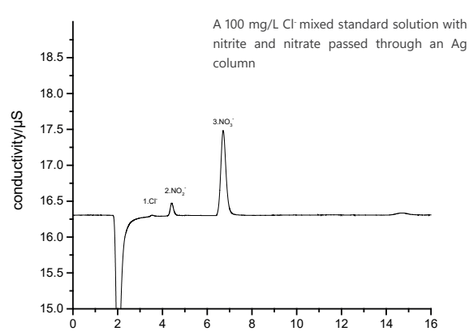
Note: the data above is based on the processing of a 5 mL sample solution

Application

Chromatogram of a 100 mg/L Cl^- mixed standard solution with low concentrations of NO^{2-} and NO^{3-}



Chromatogram of a 100 mg/L Cl^- mixed standard solution with low concentrations of NO^{2-} and NO^{3-}



A 100 mg/L Cl^- mixed standard solution with nitrite and nitrate passed through an Ag column

After the high-concentration chloride ion solution passed through the IC-Ag column, the removal rate of chloride ions exceeded 99.95%, effectively eliminating the interference of chloride ions in the determination of nitrite ions.

Standard number	Standard name	Type of pre-treatment column	Function of the pre-treatment column
GB/T 20188-2006	Determination of Bromate in Wheat Flour by Ion Chromatography	Ag/H composite type, or Ag column and H column in series	Remove chloride ions to eliminate their interference with bromate ions Remove organic matter from the sample
GB/T 24800.13-2009	Determination of Nitrite in Cosmetics by Ion Chromatography	IC-RP column	Remove organic matter from the sample
GB/T 24876-2010	Determination of Seven Anions in Livestock and Poultry Wastewater by Ion Chromatography	IC-RP column IC-H column	IC-RP: Remove organic matter IC-H/Na column: Remove heavy metals
HJ 84-2016	Determination of Inorganic Anions in Water by Ion Chromatography	IC-RP column IC-H column	
HJ 812-2016	Determination of Inorganic Cations in Water by Ion Chromatography	IC-RP column	IC-RP: Remove organic matter
HJ 799-2016	Determination of Water-Soluble Anions in Particulate Matter in Ambient Air by Ion Chromatography	IC-RP column IC-H column	IC-RP: Remove organic matter IC-H/Na column: Remove heavy metals
HJ 778-2015	Determination of Iodide in Water by Ion Chromatography	IC-RP column IC-H column	
NY/T 1374-2007	Determination of Fluoride in Plant Products by Ion Chromatography	IC-H column	Remove carbonate generated during sample processing
NY/T 1374-2007	Determination of Nitrite and Nitrate i Plant Products by Ion Chromatography	IC-RP column	Remove organic matter from the sample
SN/T 3138-2012	Determination of Bromate in Exported Noodle Products by Post-Column Derivation Ion Chromatography	IC-RP column IC-Ag column IC-H column	IC-RP column: Remove organic matter from the sample IC-Ag column: Remove chloride ions from the sample IC-H/Na column: Remove leached Ag ions
SN/T 3151-2012	Determination of Nitrite and Nitrate in Exported Food by Ion Chromatography	IC-RP column IC-Ag column IC-H column	
SN/T 3528-2013	Determination of Sulfites and Bisulfites in Imported and Exported Cosmetics by Ion Chromatography	IC-RP column	IC-RP column: Remove organic matter from the sample
3528-2013	Determination of Fluoride in Imported and Exported Cosmetics by Ion Chromatography	IC-H column	IC-H column: Remove carbonate generated during sample processing
SN/T 3608-2013	Determination of Sulfate in Exported Food by Ion Chromatography	C-RP column IC-Ag column IC-H column	IC-RP column: Remove organic matter from the sample IC-Ag column: Remove chloride ions from the sample IC-Na column: Remove leached Ag ions
SN/T 3636-2013	Determination of Iodine Content in Exported Food by Ion Chromatography	IC-RP column	IC-RP column: Remove organic matter from the sample
SN/T 3727-2013	Determination of Formic Acid and Its Salts in Exported Food by Ion Chromatography	IC-RP column IC-Ag column IC-Na column	IC-RP column: Remove organic matter from the sample IC-Ag column: Remove chloride ions from the sample IC-Na column: Remove leached Ag ions
SN/T 3931-2014	Determination of Chlorates in Exported Food by Ion Chromatography	IC-RP column	IC-RP column: Remove organic matter from the sample
SN/T 4041-2014	Determination of Hydroxyethylidene Diphosphonic Acid and Its Salts in Cosmetics and Soap Products by Ion Chromatography	IC-RP column	
SN/T 4049-2014	Determination of Hydroxyethylidene Diphosphonic Acid and Its Salts in Cosmetics and Soap Products by Ion Chromatography	IC-RP column	
SN/T4392-2015	Determination of Nitrite and Nitrate in Food by Ion Chromatography	IC-RP column IC-Ag column IC-H column	IC-RP column: Remove organic matter from the sample IC-Ag column: Remove chloride ions from the sample IC-H/Na column: Remove leached Ag ions
GB/T 5009.33-2010	Determination of Thiocyanate in Raw Milk and Dairy Products by Ion Chromatography	IC-RP column	Remove organic matter from the sample