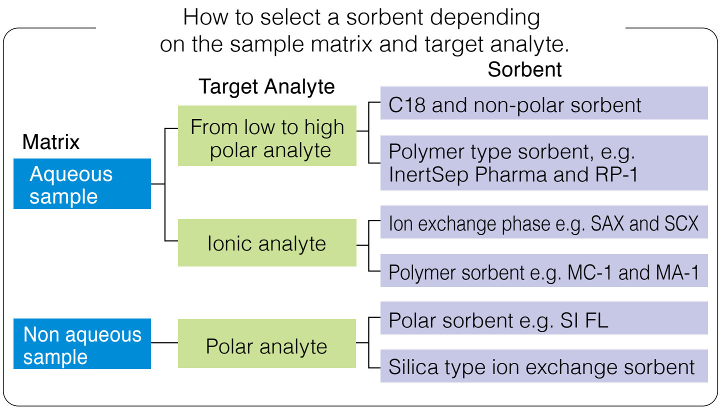
SPE Cartridge Selection Guide

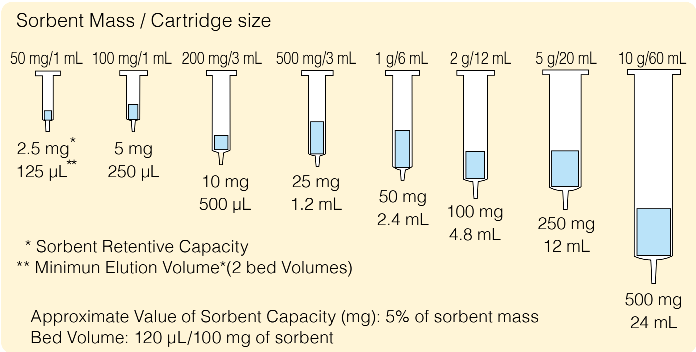
How to Select a Sorbent



One of the most important elements to achieve successful of solid phase extraction is the selection of a sorbent suitable for both the sample matrix and the target analyte.

The sorbent should be carefully selected by taking into account the chemical and physical properties of both the target analyte and the sample matrix. In addition, it is important to develop conditions that are optimal for retaining the target analyte, while removing the sample matrix, then selecting an elution solvent for maximum recovery of the target analyte.

Retentive Capacity of a Sorbent Compared to Sorbent Mass



※Bed volume is the quantity of the solvent necessary to replace the air trapped in the solid phase.
Void volume is equivalent to the bed volume

Recommendation for Selecting an Ion Exchange Sorbent

Target Analytes	InertSep		pKa*	Structure	Target Ion	
					Weak Ion	Strong Ion
Acidic	Anion Exchange	MA-1 4Class Amine	–	$-CH_2-N^+(R)_3$	✓	×
		MA-2 2Class Amine	11.0	$-CH_2-N(R)_2$	✓	×
		NH2 Aminopropyl	9.8	$-CH_2CH_2CH_2NH_2$	×	✓
		PSA 1Class, 2Class Amine	10.1,10.9	$-CH_2CH_2CH_2NHCH_2CH_2NH_2$	×	✓
		SAX Tri-Methylaminopropyl	–	$-CH_2CH_2CH_2N^+(CH_3)_3$	✓	×
		SAX-2	–	$-CH_2CH_2CH_2N^+(CH_3)_3$	✓	×
Basic	Cation Exchange	MC-1 Sulfonic Acid	1.0	$-CH_2-SO_3^-$	✓	×
		MC-2 Carboxylic Acid	4.5	$-CH_2-COO^-$	✓	×
		CBA Ethyl Carboxylic Acid	4.8	$-CH_2CH_2COO^-$	×	✓
		PRS Propyl Sulfonic Acid	1.0	$-CH_2CH_2CH_2SO_3^-$	✓	×
		SCX Benzene Sulfonic Acid	1.0	$-CH_2CH_2C_6H_4SO_3^-$	✓	×
		SCX-2	–	$-CH_2CH_2C_6H_4SO_3^-$	✓	×

* pKa reference value for each functional group.

InertSep Series Sorbent Specifications

Polymer-based Sorbent Specifications

To conduct solid phase extraction, it is necessary to choose the sorbent best suited for the properties of your target compound and sample matrix. The advantages of polymer-based sorbent are the availability in the wide pH range and the absence of secondary interaction which can occur with silica-based sorbents.

Separation mode	InertSep	Base gel	Functional group	Particle size (μm)	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)	Ion exchange capacity (meq/g)	pH range
Reversed phase	PLS-2	SDB*1	–	70	700	1.1	7	–	1-14
	PLS-3	N-MA-SDB*1	–	60	600	1.1	7	–	
	RP-1 (mini)	MA-DVB*1*2	–	70	650	1.5	9	–	
	RP-2	SDB	weak anion exchanger	90	700	0.7	4	–	
	Pharma (FF)	N-MA-SDB*1	–	60	600	1.1	7	–	
	RP-C18	SDB*1	Octadecyl	45	110	0.5	18	–	1-13
Ion exchange	MA-1 (mini)	MA*2	Quaternary ammonium	70	250	0.7	13	0.5	1-14
	MA-2 (mini)	MA*2	Diethyl amine	70	250	0.8	13	0.5	
	MC-1 (mini)	MA*2	Sulufonic acid	70	80	0.4	20	0.5	
	MC-2 (mini)	MA*2	Carboxylic acid	70	80	0.4	18	0.5	
	MPC	SDB*1	C18, Sulfonic acid	40	100	–	18	–	1-13
	ME-1	MA*2	Iminodiacetic acid	70	80	0.5	21	Cu^{2+} 0.3 mmol/g	1-14
	ME-2	MA*2	Iminodiacetic acid + Tertiary amine	70	80	0.5	21	Cu^{2+} 0.3 mmol/g	

*1 : In short time, it can be used pH 1 to 14 depending on method.

Silica-based Sorbent Specifications

The silica-based sorbent materials are more cost-effective and have a higher physical strength compared with polymer-based sorbent materials. Silica offers a wide variety of separation mechanisms using a combination of primary functional group interaction with secondary interactions due to the nature of silica.

Separation mode	InertSep	Base gel	Functional group	End capped*1	Particle size (μm)	Carbon loading (%)	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)	Ion exchange capacity	pH range
Reversed phase	C18 (FF)	SiO_2	Octadecyl (trifunctional)	Excellent	60 (120)	19	450	0.7	6	–	2-8*2
	C18-B (FF)		Octadecyl (monofunctional)	Good	45 (120)	14		0.7	6	–	
	C18-C (FF)		Octadecyl (trifunctional)	Fair	60 (120)	16		0.7	6	–	
	C18-ENV		Octadecyl (trifunctional)	Fair	60	16		0.7	6	–	
	C8		Octyl	Good	60	12		0.7	6	–	
	C8-NE		Octyl	Poor	60	12		0.7	6	–	
	C2		Ethyl	Good	60	5.5		0.7	6	–	
	CH		Cyclohexyl	Good	60	7.5		0.7	6	–	
	PH		Phenyl	Good	60	10		0.7	6	–	
Ion exchaxge	SCX	SiO_2	Benzenesulfonic acid	None	45	8.5	450	0.7	6	0.6	2-8*2
	SCX-2		Benzenesulfonic acid	None	60	17		0.7	6	1.2	
	PRS		Propylsulfonic acid	None	45	8.5		0.7	6	1.2	
	CBA		Propylcarboxylic acid	None	45	8.5		0.7	6	1.2	
	SAX		Quaternary ammonium	None	45	7		0.7	6	0.7	
	SAX-2		Quaternary ammonium	None	60	11.5		0.7	6	0.45	
	PSA		Ethylenediamine-N- propyl	None	60	11.5 (10.0-13.0)		0.7	6	1.5 (1.45-1.90)	
	NH2		AminoPropyl	None	60	10		0.7	6	0.9	
Normal phase	CN	SiO_2	Cyanopropyl	None	45	0.7	450	0.7	6	–	2-8*2
	2OH		Diol	None	60	10	450	0.7	6	–	
	Si		–	None	60	–		0.7	6	–	
	AL	Al_2O_3	Aluminium oxide	None	100	–	130	0.3	8	–	–
	FL	$MgO \cdot SiO_2$	Magnesium silicate	None	50-200	–	230	0.5	9	–	–
	FL-PR			None	100-300	–	230	0.5	9	–	–

*1 : Styrene divinylbenzene copolymer
*2 : Methacrylate polymer

Specialty Phases

InertSep	Base gel	Particle size	Surface area (m^2/g)	Pore volume (mL/g)	Pore size (nm)
GC	Graphite Carbon	120/400 mesh	85	1	45
GC-e	Graphite Carbon	100/200 mesh	90	1	50
AC	Activated Carbon	65/150 mesh	800-1200	–	–