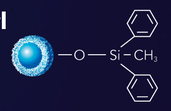
GUIDE FOR HALO® PHASE SELECTION

HALO®
innovated by
advancedmaterialstechnology

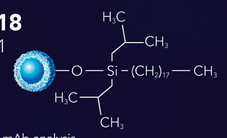
BIOCLASS PHASES

PROTEIN

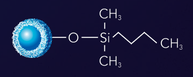
Diphenyl
USP: L11



ES-C18
USP: L1



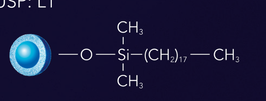
C4
USP: L26



- Ideal for mAb analysis
- Available in both 400 Å and 1000 Å pore sizes
- Best in class resolution for full characterization
- Alternate selectivities with C4, ES-C18 and Diphenyl

OLIGONUCLEOTIDE

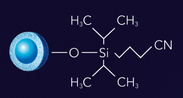
OLIGO C18
USP: L1



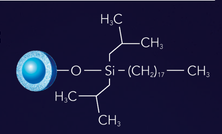
- 120 Å pore size, oligomers up to 60 bases in length
- High pH and temperature stability, designed for conditions suited for oligonucleotide separations
- UHPLC and mass spectrometry compatible stationary phase
- Surface passivated column hardware to reduce adsorption of oligonucleotides compared to standard stainless steel column hardware

PEPTIDE

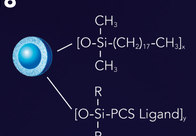
ES-CN
USP: L10



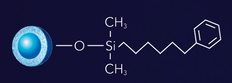
ES-C18
USP: L1



PCS C18
USP: L1



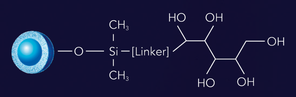
Phenyl-Hexyl
USP: L11



- Ideal for tryptic digests, post-translational modifications, polypeptides
- Alternate selectivities with ES-C18, PCS C18, ES-CN, Phenyl-Hexyl
- High temperature stability phases

GLYCAN

Glycan
USP: L95



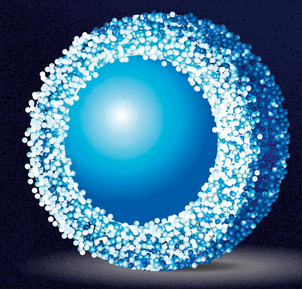
- Glycan specific solution
- Ideal for HILIC separation
- Offers high resolution even with complex glycan mixtures

HALO® SMALL MOLECULE PHASE SELECTION

Mode	REVERSED PHASE									HILIC	
Analyte Polarity	Non-polar Compounds/Hydrophobic								Polar Compounds/Hydrophilic	Very Polar Compounds	
Starting Phase Recommendation	C18										
Retention on C18	Excessive Retention Adequate Resolution	Adequate Retention/Inadequate Resolution or Peak Shape							Inadequate Retention/ Resolution		
Sample Analyte Properties			Basic Compounds	H-Bonding, Acidic or Hydroxylated Compounds	π electron Acceptors	Nitroaromatics & Heteroaromatics	Strong Dipole	Isomers		Change Separation Mode to HILIC	
Mobile Phase Characteristic		pH < 2	pH > 8	Low Ionic Strength							
Phase Recommendation	C8	LPH-C18	Elevate C18	PCS C18, PCS Phenyl-Hexyl💧	RP-Amide💧	Biphenyl💧, ES-CN💧 PFP💧, Phenyl-Hexyl💧		C30💧, PFP💧	AQ-C18💧	HILIC💧 Penta-HILIC💧	
									Still Showing Inadequate Retention/ Resolution?		

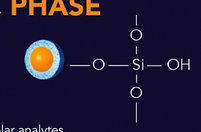
💧100% Aqueous Compatible

The Original Fused-Core® Particle Which Forged a New Path in HPLC Separations



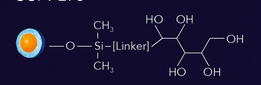
HILIC PHASE

HILIC
USP: L3



- Ideal for polar analytes
- Alternate mode to reversed phase modes
- Can be used in HILIC and normal phase modes

Penta-HILIC
USP: L95



- Ideal for polar compounds poorly retained in RPLC
- Alternate selectivity for HILIC mode
- Excellent peak shape for basic compounds in HILIC mode

HALO® BIOCLASS PHASE SELECTION

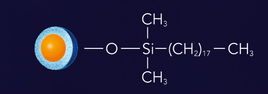
Mode	REVERSED PHASE						HILIC
Compound Types	Proteins		Peptides			Oligonucleotides	Glycans/ Glycopeptides
Application Examples	Intact mAbs | Heavy Chain/Light Chain | Top Down Proteomics		Post Translational Modifications (PTMs) | Tryptic Digests Bottom Up Proteomics				
Molecular Weight	> 50 kDa	2 kDa < MW < 500 kDa	100 Da < MW < 15 kDa				< 20 kDa
Optimal Pore Size	1000 Å	400 Å*	160 Å			120 Å	90 Å
Application Goals	Speed + Resolution	Speed	Alkyl	Alternate Selectivity	Very Hydrophobic	Low Ionic Strength Mobile Phase	
Recommended Phases	Diphenyl, ES-C18, C4	Diphenyl, ES-C18, C4	ES-C18	Phenyl -Hexyl	ES-CN	PCS C18	OLIGO C18	Glycan

* Recommended for LC systems </= 600 Bar

SMALL MOLECULE PHASES

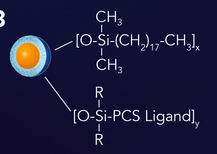
REVERSED PHASE

C18
USP: L1



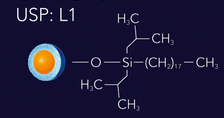
- Universal phase for acids, bases and neutral solutes
- Excellent stability at low to mid mobile phase pH
- Most commonly used alkyl phase

PCS C18
USP: L1



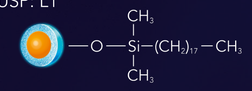
- Excellent peak shape and increased loading capacity for basic compounds
- UHPLC and LCMS compatible

LPH-C18
USP: L1



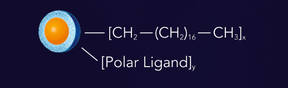
- Improved stability with low pH mobile phases of pH 1-2
- Highly reproducible alkyl chain bonded phase coverage

Elevate C18
USP: L1



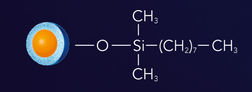
- Wide useful range of pH 2 – 12 at elevated temperature
- Ability to run basic compounds in their neutral form providing symmetrical peaks and high loading capacity

AQ-C18
USP: L1



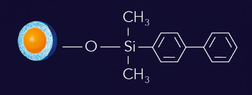
- Ideal for mixtures of polar and non-polar solutes
- High retentivity of C18 with alternate selectivity
- 100% aqueous compatible

C8
USP: L7



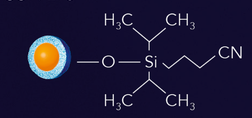
- Ideal for broad range of analytes
- Less hydrophobic (less retentive) than C18
- Better ion-pair applications than C18

Biphenyl
USP: L11



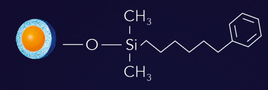
- Ideal for aromatic (pi-pi) compounds
- Alternate selectivity to alkyl phases
- 100% aqueous compatible

ES-CN
USP: L10



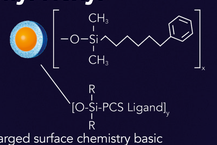
- Ideal for polar analytes
- Alternate selectivity to alkyl phases
- 100% aqueous compatible

Phenyl-Hexyl
USP: L11



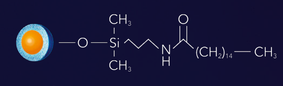
- Ideal for separating aromatic compounds using pi-pi interactions
- Alternate selectivity to alkyl phases
- 100% aqueous compatible

PCS Phenyl-Hexyl
USP: L11



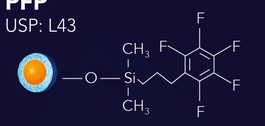
- Positively charged surface chemistry basic compounds
- UHPLC and LCMS compatible
- 100% aqueous compatible

RP-Amide
USP: L60



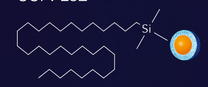
- Ideal for basic compounds (alcohols, acids, phenols, catechins)
- Alternate selectivity to alkyl phases
- 100% aqueous compatible

PFP
USP: L43



- Ideal for aromatics and electron-rich compounds
- 100% aqueous compatible

C30
USP: L62



- Ideal for hydrophobic, long chain, structurally related isomers
- Alternate alkyl phase with high shape selectivity
- 100% aqueous compatible

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