

## Macherey-Nagel Chiral Phases

- Cyclodextrin cavity
- BSA protein-bound
- Ligand exchange
- Polysaccharide

Macherey-Nagel manufacture a number of chiral phases. These include NUCLEODEX® (cyclodextrin cavity), RESOLVOSIL® (protein-bound), NUCLEOSIL® CHIRAL-1 (ligand exchange) and the NUCLEOCEL® polysaccharide columns (see page 170 for NUCLEOCEL® polysaccharide columns).

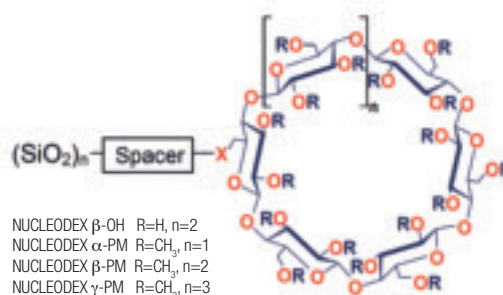
Phase	Description	Particle Size (µm)	Pore Size (Å)	USP Classification
NUCLEODEX β-OH	β-Cyclodextrin cavity	5	100	L45
NUCLEODEX α-PM	Permethylated α-cyclodextrin cavity	5	100	-
NUCLEODEX β-PM	Permethylated β-cyclodextrin cavity	5	100	L45
NUCLEODEX γ-PM	Permethylated γ-cyclodextrin cavity	5	100	-
RESOLVOSIL BSA-7	Bovine serum albumin	7	300	L75
NUCLEOSIL CHIRAL-1	L-Hydroxyproline Cu <sup>2+</sup> complex ligand exchange	5	120	L32
NUCLEOCEL DELTA and DELTA-RP	Cellulose-tris-3,5-(dimethylphenyl)-carbamate	5	-	L40

**NUCLEODEX®** phases are based on NUCLEOSIL silica bonded with modified cyclodextrins as chiral selectors. The size of the chiral ring and the formation of inclusion complexes influence the separation process. For NUCLEODEX β-OH, separations are based on hydrogen bonds and dipole interactions between functional groups of the analyte and hydroxyl groups of the cyclodextrin. For all permethylated phases, H-bonding is decreased and the hydrophobicity is increased, resulting in shorter retention times. In addition to determining enantiomeric purity, NUCLEODEX phases are also useful for the analysis of positional and cis/trans isomers.

NUCLEODEX screening kits for rapid and economical method development are available. Each kit contains a 30 x 4mm cartridge of each of the four NUCLEODEX materials, β-OH, α-PM, β-PM and γ-PM, together with a holder.

**RESOLVOSIL® BSA-7** was one of the first commercially available protein-bound columns to demonstrate optical resolution. It is based on 7µm NUCLEOSIL silica with a pore size of 300Å.

**NUCLEOSIL® CHIRAL-1** is a unique material offering separation of racemic molecules by ligand exchange HPLC. An L-hydroxyproline Cu<sup>2+</sup> complex is chemically bonded to NUCLEOSIL 120Å 5µm silica. Molecules containing two correctly spaced polar functional groups, such as α-amino acids can be optically resolved by this column through the formation of diastereomeric complexes of differing stability.



## Ordering Information

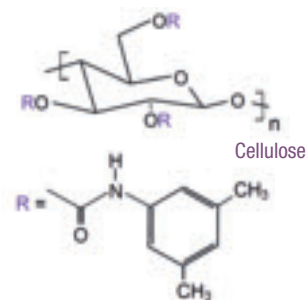
Description	Dimensions (mm)	Catalogue No.	Price
NUCLEODEX β-OH cyclodextrin	200 x 4.0	720124.40	
NUCLEODEX β-OH guard cartridge <sup>1</sup>	8 x 4.0	721460.40	
NUCLEODEX α-PM cyclodextrin	200 x 4.0	720127.40	
NUCLEODEX α-PM guard cartridge <sup>1</sup>	8 x 4.0	721464.40	
NUCLEODEX β-PM cyclodextrin	200 x 4.0	720125.40	
NUCLEODEX β-PM guard cartridge <sup>1</sup>	8 x 4.0	721462.40	
NUCLEODEX γ-PM cyclodextrin	200 x 4.0	720752.40	
NUCLEODEX γ-PM guard cartridge <sup>1</sup>	8 x 4.0	721466.40	
NUCLEODEX screening kit (4 columns)	30 x 4.0	721920	
RESOLVOSIL BSA-7	150 x 4.0	720046.40	
RESOLVOSIL BSA guard cartridge <sup>1</sup>	8 x 4.0	721702.40	
NUCLEOSIL CHIRAL-1	250 x 4.0	720081.40	
NUCLEOSIL Chiral guard cartridge <sup>1</sup>	8 x 4.0	721455.40	

<sup>1</sup> Use with guard column adaptor EC 721359. For all new applications the use of the newer alternative Column Protection System (718966 – ) and guards is recommended – see p.161

## NUCLEOCEL® Chiral Phases

- Cellulose-coated phase
- Separates wide range of chiral compounds
- Columns for NP and RP applications
- High loadability for scale up
- USP L40 designation

NUCLEOCEL® *DELTA* is manufactured by Macherey-Nagel for enantiomer separations based on a cellulose derivative. The chiral selector of NUCLEOCEL *DELTA S* is cellulose tris-3,5-(dimethylphenyl)carbamate and together with the supramolecular helical polysaccharide surface structure is mainly responsible for the chiral recognition mechanism.



The NUCLEOCEL *DELTA* product line includes columns for normal-phase and reversed-phase applications. The NUCLEOCEL *DELTA S* phase is intended for analyses using normal-phase eluents, typically heptane – IPA. The NUCLEOCEL *DELTA-RP S* phase is designed for use under reversed-phase conditions, either in polar organic mode or with eluents containing high concentrations of chaotropic salts such as perchlorate. Figures 12 and 13 show examples of separations on these columns.

NUCLEOCEL polysaccharide phases offer high loading capacities and are an ideal tool for scale-up purposes. Recommended applications include pharmaceutically active compounds, chiral pollutants (eg. herbicides, PCB), chiral compounds in food (dyes, preservatives), chiral catalysts and bioorganic compounds.

Column: NUCLEOCEL *DELTA S* (5µm, 250 x 4.6mm)  
 Eluent: n-heptane - 2-propanol (90:10)  
 Flow rate: 1ml/min  
 Temperature: 25°C  
 Detection: UV, 254nm

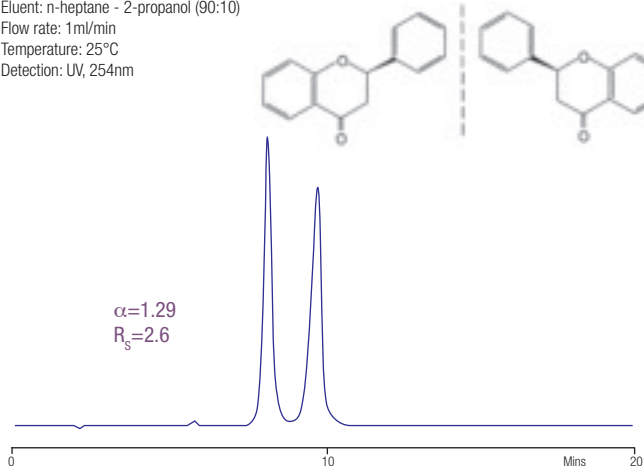


Figure 12. Analysis of flavanone

Column: NUCLEOCEL *DELTA-RP S* (5µm, 250 x 4.6mm)  
 Eluent: CH<sub>3</sub>CN – H<sub>2</sub>O (40:60)  
 Flow rate: 1ml/min  
 Temperature: 40°C  
 Detection: UV, 254nm

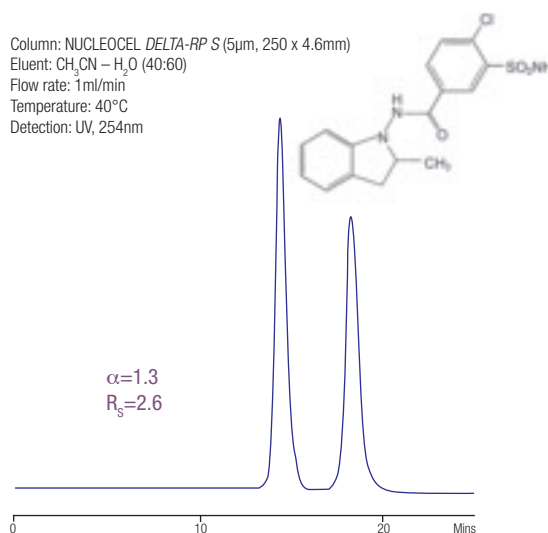


Figure 13. Analysis of indapamide

### Ordering Information – NUCLEOCEL Polysaccharide Columns

NUCLEOCEL Phase	Column Dimensions (mm)		Guard Cartridges	
	150 x 4.6	250 x 4.6	CC guard cartridges <sup>1</sup>	EC guard cartridges <sup>2</sup>
<i>DELTA S</i>	720446.46	720445.46	721002.40	721185.30
<i>DELTA-RP S</i>	720451.46	720450.46	721003.40	721186.30

<sup>1</sup> 8 x 4mm. Use with guard column adaptor EC 721359

<sup>2</sup> 4 x 3mm. Use with Column Protection System guard column holder 718966

– see p.161 for further details. For all new applications the use of the newer alternative Column Protection System is recommended