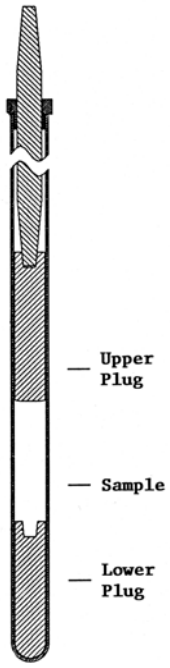
Distributed by Wilmad-Lab Glass
1172 Northwest Blvd
Vineland, NJ 08360
Phone 1-800-220-5171
Phone 856-691-3200
Fax 856-205-1984
website: www.wilmad-labglass.com

Doty Susceptibility-Matched Sample Plugs for High-Resolution Liquids NMR

Triple the Sensitivity in Sample-Limited Applications
Eliminate Convection Artifacts in Large-Sample NMR

Robust
Low cost
No bubbles
No problems
Easy to use

Wide selection for:
All NMR tubes
Low backgrounds
Susceptibility match
Chemical compatibility



HR-NMR has normally required a sample length three to five times that of the active coil length because it is generally impossible to shim out the effects of a magnetic susceptibility discontinuity at a material interface (air-sample, or glass-sample) that is not parallel to B_0. The greater the susceptibility discontinuity, the further it must be from the sensitive region. Plugs matched to the solvent's susceptibility within 5% eliminate the need for 80% of the excess sample and allow sensitivity to be tripled (because of higher concentration) with no loss in resolution. Moreover, lineshape and resolution in older probes are dramatically improved.

Doty's design solves problems with: bubble removal, glass breakage, sample length adjustment, backgrounds, and VT.

An important, new application for these plugs occurs for large samples of low solubility. Thermal gradients as small as 0.2°C in larger non-spinning sample tubes (8 mm to 15 mm) can drive sample convection and may cause serious spectral artifacts.[1] Susceptibility-matched plugs eliminate these artifacts and permit VT HR-NMR on large, non-spinning samples.

Plug Materials: Susceptibility and Chemical Compatibility
Select plug material with magnetic susceptibility similar to that of the sample solvent.
Select Kel-F or zirconia when wideline ^1H backgrounds would cause problems

	Kel-F	(reference) Pyrex	PPS	Aurum	Ultem	Zirconia	GFP	G-10
$-\chi_{VC}$ (ppm, cgs)	**0.92**	**0.86**	**0.73**	**0.71**	**0.71**	**0.70**	**0.52**	**~ 0.5**
Wideline NMR Backgrounds	F, Cl, C	**Si, B, Al, Na**	H, C, S	H, C, N	H, C, N	Zr	H, C, Al, Si, F	H, C, Al, Si, F
H_2O absorp. %	0.02	**0.01**	0.03	0.8	0.7	0.01	0.2	0.15
Density, g/cm^3	2.1	**2.5**	1.35	1.42	1.27	5.7	1.45	1.88
Max use T, °C	150	**400**	120	240	205	700	250	160
Color	clear	**glass**	ivory	black	amber	white	grey	green
Chemical Resistance: E- Excellent; G- Good, usually acceptable; F- Fair, sometimes acceptable; P- Poor								
Strong acids	E	**E**	G	G	G	E	P	F
Strong bases	E	**E**	E	G	G	E	G	E
Alcohols & Aliphatics	E	**E**	E	E	E	E	E	E
Aromatic H-C	E	**E**	E	E	G	E	E	E
Esters & Ketones	E	**E**	E	E	E	E	E	E
Chloro-solvents	E	**E**	E	G	F	E	G	G

Volumetric suscept. χ_V in S.I. is related to vol. suscept. χ_{VC} in cgs by: $\chi_V = 4\pi\chi_{VC}$

Solvent	Suscept.
$C_3H_8O_3$	0.779
C_6H_5Br	0.753
$CHCl_3$	0.74
H_2O	0.719
D_2O	0.70
CS_2	0.70
CCl_4	0.691
C_8H_{16}	0.684
C_6H_{12}	0.627
C_7H_8	0.618
C_6H_6	0.611
C_6H_5NO	0.604
C_3H_80	0.598
C_2H_6O	0.575
$(C_2H_5)_2$	0.534
CH_4O	0.53

[1] J. Lounila et al, *J. Magn. Reson. Ser. A*, **118**, 1996.

Abbreviations: **Kel-F**, p-chlorotrifluoroethylene; **G-10**, 60% e-glass epoxy composite; **PPS**, p-phenylene sulfide; **Aurum**, thermoplastic polyimide; **Ultem**, p-etherimide; **GFP**, glass-filled PEEK (p-etheretherketone) ; **CPVC**, chlorinated-p-vinylchloride.