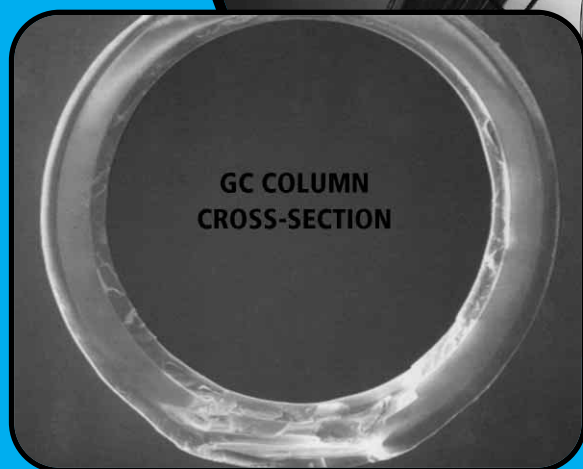


PHAT PhaseTM CAPILLARY COLUMNS



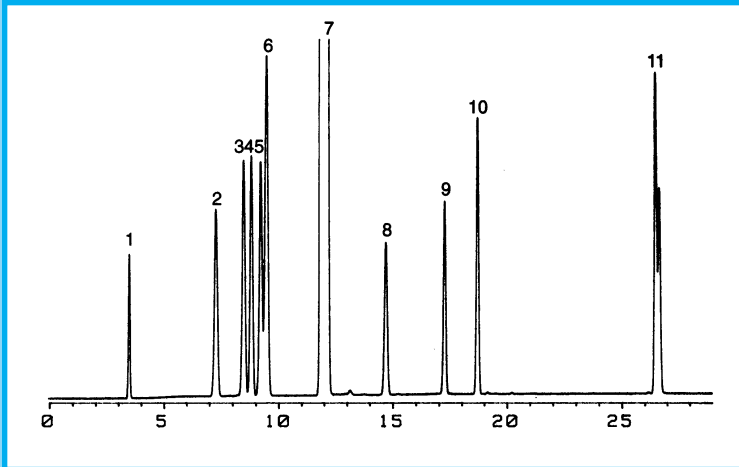
**The next evolution in gas chromatography
– exclusively from QUADREX**



PO Box 3881, Woodbridge, CT 06525
(203) 393-3112 • FAX (203) 393-0391
TOLLFREE: 1-800-275-7033
E-MAIL: tech@quadrexcorp.com

- *Very thick films - up to 18 microns!*
- *High sample capacity for trace analysis*
- *Increased retention of volatiles*
- *Excellent deactivation*
- *Unique manufacturing process*

PHAT PHASE™ APPLICATIONS



ASTM D5441 - Impurities in MTBE

Column: 007-1, Dimethylpolysiloxane
20M. x 0.18mm I.D. x 6.0µm film
Cat. No.: 007-1-20HS-6.0F

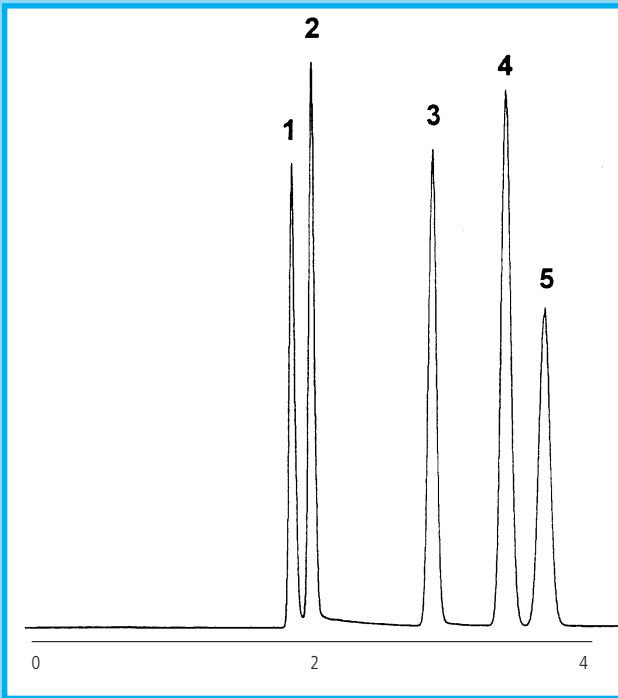
Temperature: 40°(3 min. hold)
(5°/min.) - 100° - (12°/min) - 210°C

Flow: 12 psi, Helium

Injector: 225°C

Detector: 300°C, FID

- | | |
|----------------------|---|
| 1. methanol | 7. MTBE |
| 2. 2-methylbutane | 8. t-butyl ethyl ether |
| 3. pentane | 9. t-amyl methyl ether |
| 4. cis-2-pentene | 10. 2,2,4-trimethyl-1-pentene |
| 5. trans-2-pentene | 11. cis/trans-2,2',4,6,6'-pentamethyl-3-heptene |
| 6. 2 methyl-2-butene | |



Blood Alcohols

Column: 007-1, Bonded Dimethylpolysiloxane
30M. x 0.32mm I.D. x 10.0µm film
Cat. No.: 007-1-30W-10.0F

Temperature: 40° (3 min. hold) (12°/min.) -200°C

Injector: 200°C

Detector: 250°C, FID

Carrier: 40 cm/sec., Helium

- | | |
|-----------------|----------------|
| 1. acetaldehyde | 4. acetone |
| 2. methanol | 5. isopropanol |
| 3. ethanol | |

C1 to C10 Hydrocarbons

Column: 007-1, Dimethylpolysiloxane
20M. x 0.18mm I.D. x 6.0µm film
Cat. No.: 007-1-20HS-6.0.0F

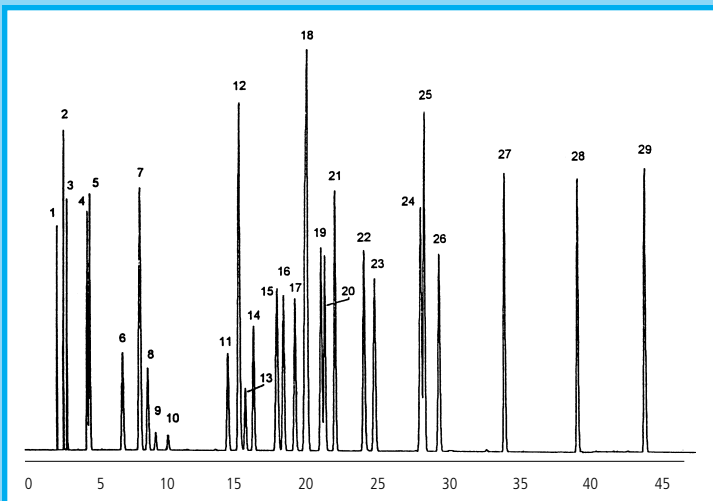
Temperature: 35° (3 min. hold)
(2°/min.) - 48° - (6°/min.) - 210°C, hold.

Injector: 200°C

Detector: 280°C, FID

Carrier: 19.0cm/sec., Helium

- | | |
|-----------------------------|---|
| 1. methane | 17. 4-methyl-1-pentene |
| 2. ethylene | 18. 2,3-dimethylbutane
& 2-methylpentane |
| 3. ethane | 19. 3-methylpentane |
| 4. propylene | 20. 1-hexene |
| 5. propane | 21. hexane |
| 6. isobutane | 22. 2,4-dimethylpentane |
| 7. isobutylene & 1-butene | 23. 2,2,3-trimethylbutane |
| 8. butane | 24. isooctane
(2,2,4-trimethylpentane) |
| 9. trans-2-butene | 25. heptane |
| 10. cis-2-butene | 26. 2,2,4-trimethyl-1-pentene |
| 11. 1-pentene | 27. octane |
| 12. pentane | 28. nonane |
| 13. trans-2-pentene | 29. decane |
| 14. cis-2-pentene | |
| 15. 2,2-dimethylbutane | |
| 16. 3-methyl-1,4-pentadiene | |



Residual Solvents in Drugs (USP Method 467)

Column: 007-1, Dimethylpolysiloxane
30M. x 0.32mm I.D. x 10.0µm film
Cat. No.: 007-1-30W-10.0F

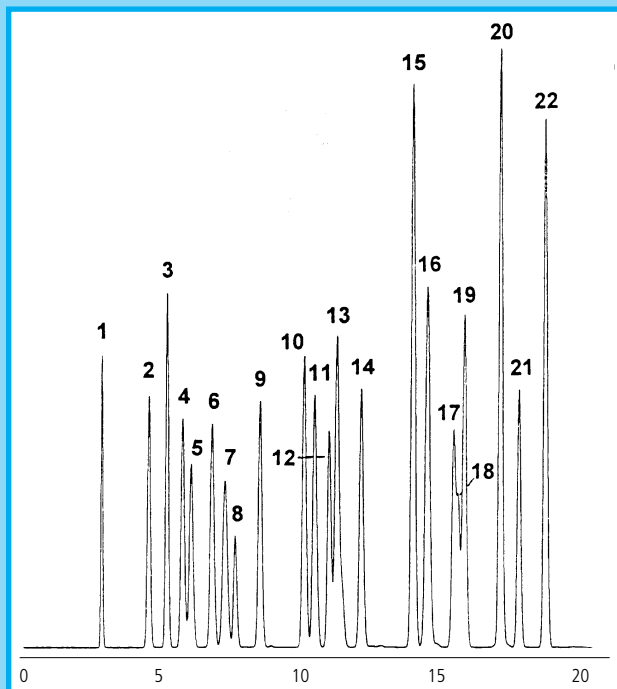
Temperature: 50° (4 min. hold) (5°/min.) - 200°C

Injector: 220°C

Detector: 290°C, FID

Carrier Gas: 25 cm/sec., Helium

- | | |
|-------------------------|-------------------------|
| 1. methanol | 12. ethyl acetate |
| 2. ethanol | 13. chloroform & hexane |
| 3. acetonitrile | 14. tetrahydrofuran |
| 4. acetone | 15. benzene |
| 5. isopropanol | 16. cyclohexane |
| 6. diethylether | 17. 1,4-dioxane |
| 7. methylene chloride | 18. trichloroethylene |
| 8. tert-butanol | 19. heptane |
| 9. propanol | 20. pyridine |
| 10. methyl ethyl ketone | 21. dimethylformamide |
| 11. sec-butanol | 22. toluene |



Ethylene Oxide

Column: 007-1, Dimethylpolysiloxane
30M. x 0.32mm I.D. x 10.0µm film
Cat. No.: 007-1-30W-10.0F

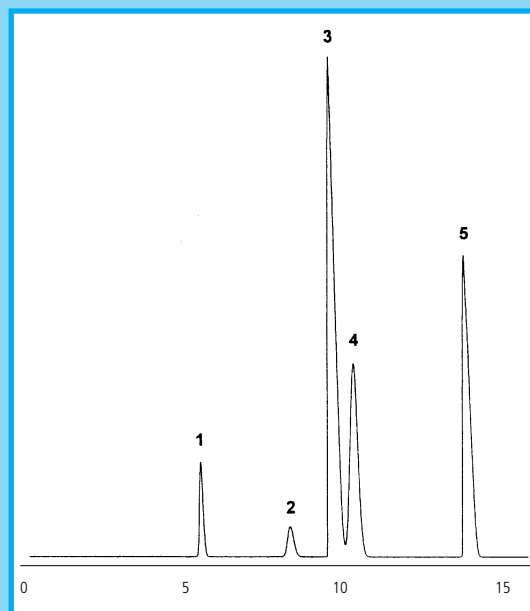
Temperature: 50° (3 min. hold) (6°/min.) - 200°C

Injector: 220°C

Detector: 290°C, FID

Carrier Gas: 26 cm/sec., Helium

- | | |
|-----------------------|---------------|
| 1. ethylene oxide | 4. Freon 113 |
| 2. Freon 11 | 5. chloroform |
| 3. methylene chloride | |



L.M.W. Amines

Column: 007-1, Dimethylpolysiloxane
20M. x 0.18mm I.D. x 6.0µm film
Cat. No.: 007-1-20HS-6.0F

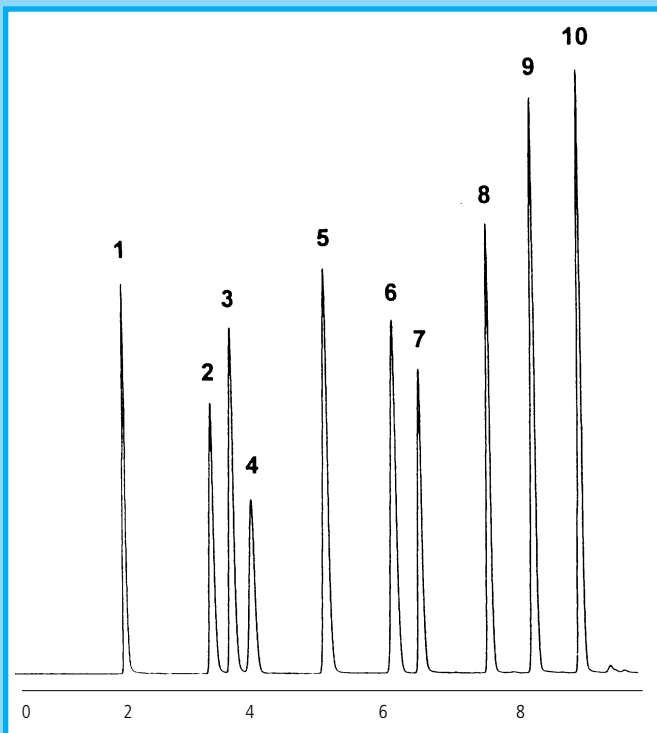
Temperature: 45° (4.5 min. hold)(16°/min.) - 230°C

Injector: 220°C

Detector: 300°C, FID

Carrier Gas: 22psi, Helium

- | | |
|-------------------|--------------------|
| 1. methylamine | 6. tert-butylamine |
| 2. dimethylamine | 7. propylamine |
| 3. ethylamine | 8. diethylamine |
| 4. trimethylamine | 9. isobutylamine |
| 5. isopropylamine | 10. butylamine |



PHAT PHASE™ THICK FILM GC CAPILLARY COLUMNS

The GC analysis of gases and other types of low molecular weight compounds traditionally has been accomplished on packed columns with heavy loadings or by adsorbent type columns. Porous layer open tubular (PLOT) capillary columns have also been widely accepted for the separation of these low molecular applications. There are, however, some drawbacks in using these types of columns, including low resolution and efficiency (packed columns) and sample adsorption and bead migration within the column (PLOT columns). Thick film coated open tubular (WCOT) capillary columns have been used, but for the longest time available film thickness had been confined to a maximum 8.0 micron films due to limitations in conventional column coating technology. These factors have limited the separating capability of WCOT columns for low molecular weight compounds.

In 1990 QUADREX embarked on a multi-year development project to devise an automated column manufacturing system. The result of this long term project is a sophisticated device we call the "column workstation." Several of these have now been in steady use in our column production lab since their completion in the mid-1990's.

Originally designed to automate and accelerate standard column production, this unique workstation technology also enables us to coat extremely thick films of selected non-polar phases onto fused silica capillary tubing. As a result, our standard range of films is now extended from 0.1 - 3.5 microns on 0.10mm I.D. columns, up to 18.0 microns on 0.53mm I.D. columns. With these PHAT Phase™ thick film columns, QUADREX now offers a wider range of film thickness choices than any other column manufacturer.

Incorporating the PHAT Phase™ workstation technology onto the production narrow bore columns, Quadrex Corporation can produce high speed PHAST GC™ columns which combine the high speed characteristics of the narrow bore columns with the high sample loading and highly retentive nature of PHAT Phase™ thick films. PHAT Phase™ columns with 0.53mm I.D.'s can be successfully used for the separation of wide range of molecular weight compounds Unlike PLOT columns, PHAT Phase™ columns are not limited in the MW of the sample components. Hydrocarbons beyond C10 can also be separated easily and efficiently. Irreversible adsorption can occur with PLOT-Type capillary columns. Consequently, quantitative results may not be accurate. This is especially true of reactive compounds such as

amines. Well deactivated PHAT Phase™ columns are not susceptible to this problem and more reliable quantitative results can be achieved.

- Phase ratios comparable to heavily loaded packed columns
- Narrow bore 0.10mm to wide bore 0.53mm I.D. columns
- Widest range of film thicknesses
- High sample capacity for trace analyses
- Increased retention of volatile compounds leading to higher elution temperatures
- Excellent deactivation

The unique workstation technology utilized by Quadrex yields reproducible films for columns with inner diameters ranging from 0.10mm to 0.53mm. The listing below indicates the maximum range of films which are attainable.

Column ID	Maximum Length*	Maximum Film
0.10mm	10M	3.5µm
0.18mm	20M	6.0µm
0.25mm	30M	8.0µm
0.32mm	30M	12.0µm
0.53mm	30M	18.0µm

* longer lengths can be achieved but at below the maximum film range.

Application areas for 007-1, Dimethylpolysiloxane PHAT Phase™ columns include the analysis of natural gas, auto emissions, light hydrocarbon refinery cuts, amines, alcohols, free fatty acids, refrigerants, residual solvents and air pollutants as defined in the EPA TOC Methods.

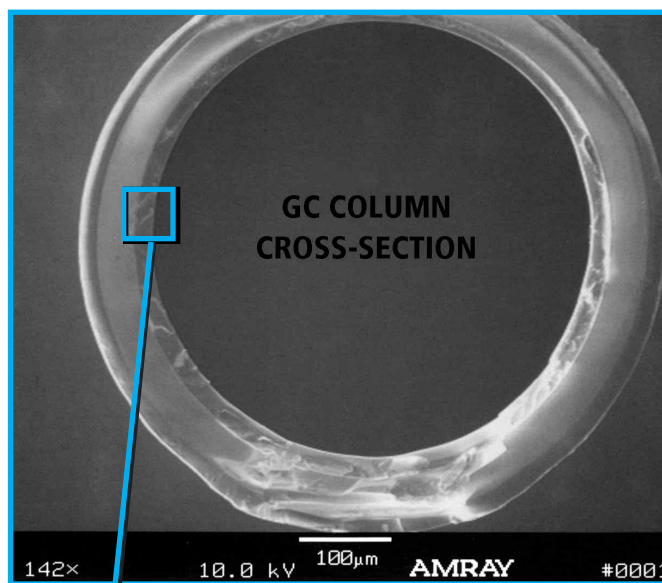
ORDERING INFORMATION

PHASE TYPES: 007-1, Dimethylpolysiloxane
OR 007-5, 5% Phenyl Methylpolysiloxane

To complete the catalog number, insert Phase Type (007-1 or 007-5) and Film Thickness where noted.

I.D.	Length	PHAT Phase™ Films (µm)	Price	Catalog Number
0.10mm	10M.	1.0, 3.5	\$420.00	(Phase Type #-)10NB-(film) F
	15M.	1.0, 3.5	\$475.00	(Phase Type #-)15NB-(film) F
	20M.	1.0, 3.5	\$505.00	(Phase Type #-)20NB-(film) F
0.18mm	10M.	1.0, 3.0, 6.0	\$430.00	(Phase Type #-)10HS-(film) F
	15M.	1.0, 3.0, 6.0	\$470.00	(Phase Type #-)15HS-(film) F
	20M.	1.0, 3.0, 6.0	\$525.00	(Phase Type #-)20HS-(film) F
	25M.	1.0, 3.0, 6.0	\$550.00	(Phase Type #-)25HS-(film) F
0.25mm	10M.	3.0, 5.0, 8.0	\$265.00	(Phase Type #-)10-(film) F
	15M.	3.0, 5.0, 8.0	\$315.00	(Phase Type #-)15-(film) F
	25M.	3.0, 5.0, 8.0	\$445.00	(Phase Type #-)25-(film) F
	30M.	3.0, 5.0, 8.0	\$495.00	(Phase Type #-)30-(film) F
0.32mm	10M.	8.0, 10.0, 12.0	\$315.00	(Phase Type #-)10W-(film) F
	15M.	8.0, 10.0, 12.0	\$390.00	(Phase Type #-)15W-(film) F
	25M.	8.0, 10.0, 12.0	\$525.00	(Phase Type #-)25W-(film) F
	30M.	8.0, 10.0, 12.0	\$630.00	(Phase Type #-)30W-(film) F
0.53mm	10M.	10.0, 12.0, 15.0, 18.0	\$395.00	(Phase Type #-)10V-(film) F
	15M.	10.0, 12.0, 15.0, 18.0	\$445.00	(Phase Type #-)15V-(film) F
	25M.	10.0, 12.0, 15.0, 18.0	\$610.00	(Phase Type #-)25V-(film) F
	30M.	10.0, 12.0, 15.0, 18.0	\$685.00	(Phase Type #-)30V-(film) F

Custom lengths and films available.



The QUADREX standard range of films is now extended – from 0.1 - 3.5 microns on 0.10mm I.D. columns, up to 18 microns on 0.53mm I.D. columns!

Call, write, e-mail us for a copy of our FREE General Catalog • Visit us at <http://www.quadrexcorp.com>

Overseas: Quadrex Scientific, Box 79, Waybridge, Surrey, KT139RA, UK • (193-23) 47648 • Fax 44-193-233-6028