

Column Selection for Gas and Light Hydrocarbon Analysis by Packed Column GC

This bulletin is a reprint of a review article published in the Journal of Chromatographic Science in September, 1978. The article presents chromatograms for various combinations of 56 sample gases, illustrating separations which can be obtained by using selected packed columns. The chromatograms show the quality of separation, the packing, and the conditions used for the analysis. A list of current Supelco publications offers information about additional, newer materials that offer improved separations or peak symmetry for some of these analytes.

Key Words:

- permanent gases ● light hydrocarbons
- light sulfur compounds ● packed column GC

The major part of this bulletin is a reprint of a review article, *The Analysis of Gases and Light Hydrocarbons by Gas Chromatography*, which was published in the *Journal of Chromatographic Science* in September, 1978. The article presents chromatograms for various combinations of 56 sample gases, illustrating separations which can be obtained by using selected packed columns. The 56 analytes are listed in alphabetical order on page 1 of the review article, accompanied by the number of the chromatogram or chromatograms showing the separation. The chromatogram shows the quality of separation, the packing, and the conditions used for the analysis. To select a packing for your application:

- 1 Locate on page 1 of the review article the gas or gases you want to analyze.

- 2 Refer to the chromatogram(s) listed for the analyte(s).
- 3 Locate the required packing and/or column in the alphabetical listing of column packings and columns which follows. This table presents the information required to order the required packings and columns.

Because we often get inquiries about these packings, we continue to make this bulletin available. Some of the packings listed in the review article are no longer available, however, and some can be replaced by newer materials that offer improvements in separations or peak symmetry. Consult the list of current Supelco publications on the back page of this bulletin for information about our most recently-developed packings and columns.

Listing of Column Packings and Columns

The table that follows is an alphabetical listing of the columns and packings used to produce the chromatograms in the review article. For easy reference, each entry includes reference to the chromatogram(s) produced by the column. Entries accompanied by a catalog number currently are in stock at Supelco; ordering by this number provides faster delivery to you. If the packing you need does not have a catalog number, but is available as a custom product, simply order it by the description in the table.

To order a column for your instrument, refer to the back page of this publication. Please note that we have in stock empty glass columns for almost any packed column chromatograph currently in use. These stock columns are listed in our catalog. If you do not already have a copy of our most recent catalog, free copies are available upon request.

Chromatogram Number	Packing / Packed Column	Catalog No.
1	activated alumina, Fe(OH) ₂ treated, 80/100 20% bis(2-methoxyethyl)adipate on 60/80 Chromosorb® P AW, 20g bottle	not available custom
16	20% bis(2-methoxyethyl)adipate on 60/80 Chromosorb P AW in 24' x 1/8" stainless steel column	custom custom
46	Carbopack™ B/2% Carbowax® 20M/0.5% H ₃ PO ₄ , 60/80, 15g bottle Carbopack B/2% Carbowax 20M/0.5% H ₃ PO ₄ , 60/80 in 4' x 1/8" Teflon® (FEP) column	custom custom
37	Carbopack B/0.3% glycerol/0.3% H ₃ PO ₄ , 60/80, 15g bottle	custom
40	Carbopack B/0.3% glycerol/0.3% H ₃ PO ₄ , 60/80 in 2m x 1/4" (4mm ID) stainless steel column ⁵ in 2m x 2mm ID ⁴ glass column ¹ Carbopack B/10% H ₃ PO ₄ , 60/80, 15g bottle	custom custom custom

Footnotes listed on page 3.

Chromatogram Number	Packing / Packed Column	Catalog No.
25	Carbopack B/10% H ₃ PO ₄ , 60/80 in 2m x 1/8" (3mm) OD Teflon (FEP) column	custom
26	Carbopack B HT/20% polyfluoroether/20% benzophenone, 60/80	not available
	Carbopack B/1% SP™-1000, 60/80, ⁶ 15g bottle	11815
29	Carbopack B/1% SP-1000, 60/80 ⁶ in 6' x 1/8" stainless steel column	custom
	Carbopack B/2% TEPA, 60/80, 15g bottle	custom
53	Carbopack B/2% TEPA, 60/80 in 2m x 2mm ID ⁴ glass column ¹	custom
	Carbopack B/1.5% XE-60/1% H ₃ PO ₄ , 60/80, ⁷ 15g bottle	11828
45	Carbopack B/1.5% XE-60/1% H ₃ PO ₄ , 60/80 ⁷ in 6' x 2mm ID glass column	custom
	Carbopack C/0.2% Carbowax 1500, 60/80, 15g bottle	11826
24, 32	Carbopack C/0.2% Carbowax 1500, 60/80 in 6' x 1/8" stainless steel column	custom
	Carbopack C HT, 60/80, 10g bottle	10259
31	Carbopack C HT, 80/100 in 2m x 1/8" (2mm) stainless steel column ⁵	custom
	Carbopack C/0.19% picric acid, 80/100, 15g bottle	11824
18	Carbopack C/0.19% picric acid, 80/100 in 2m x 1/8" stainless steel column	13867
11	Carbosieve™ B, 60/80	not available*
43	Carbosieve B, 80/100	not available*
6, 38, 55, 61	Carbosieve S, 60/80	not available*
62	30% Carbowax 20M on Chromosorb 101, 80/100	not available
	Chromosil 310, 60/80 ⁶ (available only in packed columns)	
28	in 3' x 1/8" Teflon (FEP) column	custom
39	in 6' x 1/8" Teflon (FEP) column	11501
35	in 8' x 1/8" stainless steel column	custom
27	in 10' x 1/8" Teflon (FEP) column	custom
34	in 15' x 1/4" stainless steel column	custom
47	Chromosil 330, 80/100 (available only in packed columns) in 6' x 1/8" Teflon (FEP) column	11496
	Chromosorb 102, 60/80, 50g bottle	20200-U
	Chromosorb 102, 60/80	
23	in 6' x 2mm ID ⁴ glass column	custom
8	in 12' x 1/8" stainless steel column	custom
	Chromosorb 102, 80/100, 50g bottle	20201
	Chromosorb 102, 80/100	
5	in 12' x 1/8" stainless steel column	custom
3	in 15' x 1/8" stainless steel column	custom
58	in 20' x 1/8" stainless steel column	custom
	Chromosorb 103, 80/100, 50g bottle	20217
52	Chromosorb 103, 80/100 in 6' x 2mm ID ⁴ glass column	custom
	Chromosorb 105, 80/100, 50g bottle	custom
44	Chromosorb 105, 80/100 in 2.5' x 1/8" Teflon (FEP) column	custom
	20% DC-200 on 100/120 Chromosorb W AW-DMCS, 20g bottle	custom
33	20% DC-200 on 100/120 Chromosorb W AW-DMCS in 6' x 1/8" stainless steel column	custom
	30% DC-200 (500 centistokes) on 60/80 Chromosorb P AW, 20g bottle	custom
22	30% DC-200 (500 centistokes) on 60/80 Chromosorb P AW	Price
	in 32.5' x 1/8" stainless steel column	on Request
51	5% 2,4-Dimethylsulfolane on 100/120 Chromosorb W AW ²	custom
15, 19	Durapak® n-Octane on 100/120 Porasil® C	not available
12	Durapak phenyl isocyanate on 80/100 Porasil C in 6' x 1/8" column	custom
	15% EDO-1 on 60/80 Chromosorb P AW, 20g bottle	custom
21	15% EDO-1 on 60/80 Chromosorb P AW in 20' x 3/16" stainless steel column	custom
	Molecular Sieve 5A, 45/60, 50g bottle	20301
	Molecular Sieve 5A, 45/60	
4A	in 3' x 1/8" stainless steel column	custom
57	in 6' x 1/8" stainless steel column	custom
2	in 16' x 1/8" stainless steel column	custom
7	in 5m x 1/8" (3.18mm) stainless steel column ⁵	custom
36	Molecular Sieve 5A, (Linde type), 45/60	not available
	Molecular Sieve 13X, 45/60, 50g bottle	20304

Footnotes listed on page 3.

Chromatogram Number	Packing / Packed Column	Catalog No.
4B	Molecular Sieve 13X, 45/60 in 6' x 1/8" stainless steel column	custom
	17% β, β' -oxydipropionitrile on 100/120 activated alumina, 20g bottle	custom
17	17% β, β' -oxydipropionitrile on 100/120 activated alumina in 1/16" stainless steel column	not available
	Porapak [®] N, 80/100, 75cc bottle	20325
14	Porapak N, 80/100 in 4' x 1/8" stainless steel column	custom
	Porapak R, 50/80, 75cc bottle	20333
	Porapak R, 50/80	
20	in 3m x 1/8" (2.3mm) stainless steel column ⁵	custom
10	in 8' x 1/8" stainless steel column	custom
	Porapak R, 80/100, 75cc bottle	20334
59	Porapak R, 80/100 in 1.2m x 1/4" (6mm) stainless steel column	custom
	Porapak R, 100/120, 75cc bottle	20335
60	Porapak R, 100/120 in 6' x 1/8" stainless steel column	custom
	Porapak Q, 50/80, 75cc bottle	20330
	Porapak Q, 50/80	
10	in 8' x 1/8" stainless steel column	custom
9	in 12' x 1/4" stainless steel column	custom
	Porapak Q, 80/100, 75cc bottle	20331
37	Porapak Q, 80/100 in 2m x 1/8" (4mm) stainless steel column ⁵	custom
50	Porapak QS (acetone washed), 80/100 ⁸ (available only in packed columns)	
	in 30" x 1/8" Teflon (FEP) column (18" of column is packed)	12255-U
	Porasil B, 80/100, 75cc bottle	20311
13	Porasil B, 100/150 in 8' x 1/8" stainless steel column	custom
49	12% Polyphenyl ether (5 ring)/0.5% H ₃ PO ₄ on 40/60 Chromosorb T (available only in packed columns)	
	in 36' x 0.085" OD Teflon (FEP) column	11500
5%	QF-1 on 80/100 Porapak QS, 20g bottle	custom
42, 28	5% QF-1 on 80/100 Porapak QS in 6' x 1/8" (3mm OD) stainless steel column	custom
56	10% SF [®] -96 on 30/40 Fluoropak 80	not available
30	Spherosil [®] XOB-075, 70/170	not available
	15% UCON [®] -50-HB-280X on 40/60 Chromosorb T, 20g bottle	custom
41	15% UCON-50-HB-280X on 40/60 Chromosorb T in 6' x 1/8" Teflon (FEP) column	custom
	10% Versamid [®] 900/8% KOH on 80/100 Porapak Q, ³ 20g bottle	custom
54	10% Versamid 900/8% KOH on 80/100 Porapak Q ³ in 2m x 1/4" OD copper column	custom

¹2mm ID glass column substituted for 3mm ID glass column.

²Chromosorb W AW substituted for Inerton.

³Porapak Q substituted for Phasepak Q, which is not commercially available.

⁴Both 2mm and 4mm ID glass columns are 1/4" OD.

⁵Outside diameters of stainless steel columns are listed in inches. Where a chromatogram gives OD in metric units, we have converted the value to inches.

⁶60/80 mesh Chromosil 310 and Carbo-pack B/1% SP-1000 have been substituted for 80/100 mesh materials (80/100 materials not available).

⁷In the review article, the packing for chromatogram is incorrectly listed as containing 1% XE-60 and 1.5% H₃PO₄. The description should be 1.5% XE-60/1% H₃PO₄. The packing listed in the table (Cat. No. 1-1828) is the correct packing for chromatogram 45.

⁸Supelpak[™] S is our equivalent.

*For a replacement packing, refer to the list of current literature on the back page of this bulletin.

Custom Columns

When ordering a custom column refer to our catalog, or call our sales department. Information we will need to prepare your column is: instrument manufacturer and model number, column length and diameter, tubing material, stationary phase and % coating, and support name, mesh, and treatment. Before you order your column, be sure to check our catalog. Glass columns for many instruments are available as stocked items, either empty or packed. You save time and money when you buy stocked items. If you select a stocked glass column, simply indicate the catalog number of the empty glass column and the catalog number or description of the packing to be used.

Current Literature on Packed Column Analyses of Gases

The following publications describe analyses on packings/columns developed since 1978, or give much additional information not presented in the review article. These publications are free on request.

Bulletin 722 – *Analyses of Sulfur Gases at Trace and Low Percent Levels, Using Packed Column GC*

Bulletin 743 – *Separation of Hydrocarbons by Packed Column GC*

Bulletin 769 – *Monitoring Airborne Contaminants in Workplace Atmospheres, Using Sampling Devices and GC or HPLC*

Bulletin 802 – *SP-1700 GC Column Provides Reproducible Hydrocarbon Analyses*

Bulletin 815 – *Separating Unsaturated C4 and C5 Hydrocarbons*

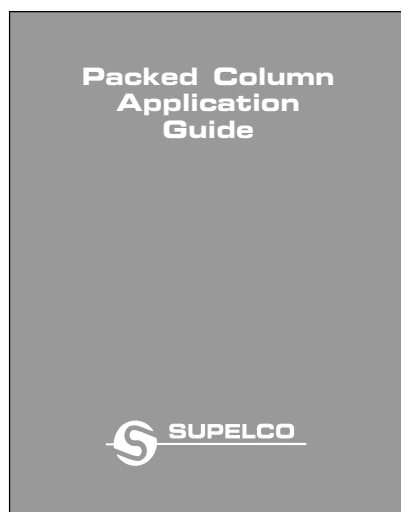
Bulletin 850 – *Simultaneously Monitor Saturated and Unsaturated C2-C6 Hydrocarbons in Air Samples*

Application Note 10 – *Efficient Analyses of Permanent Gases, Light Hydrocarbons, and Light Polar Compounds by GSC (Describes Carboxen™-1000, a replacement packing material for Carboxieve packings)*

Publication 97982 – *HayeSep Porous Polymers*
(HayeSep® polymers are modern, efficient replacements for many of the packings listed in this bulletin)

In addition to these publications, our general catalog is an excellent source of information about packed column GC. Included in our current catalog are micropacked columns (1/16" OD x 0.75mm ID) packed with Carboxen, HayeSep, Molecular Sieve 5A, and other packings for gas analyses. Also described are carbon layer open tubular (CLOT), support-coated open tubular (SCOT) and porous layer open tubular (PLOT) capillary columns, many of which are well suited to analyses of light hydrocarbons and other gases.

The Definitive Guide to Packed Column GC



895-0005

Our *Packed Column Application Guide* (Bulletin 890) contains 96 pages of applications incorporating packed column GC: environmental analyses, foods and beverages, clinical applications, and others. Some of these chromatograms have not yet appeared in any other Supelco literature. Like our other literature, the guide is free on request.

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