

## GC/HPLC Analyses of Organic Compounds in Drinking Water: US EPA Procedures

*This bulletin summarizes the analyses for organic compounds in drinking water according to US Environmental Protection Agency Series 500 methodology. Sample preparation, chromatography columns, and detection are described for each class of compounds. Most of the analyses are illustrated with chromatograms. Supelco products, most of which are tested for environmental applications, are listed for each method.*

### Key Words:

- drinking water
- US EPA Series 500 methods
- water quality

In the United States, drinking water quality is monitored according to the US Environmental Protection Agency's Series 500 methods (1).<sup>\*</sup> Most of these methods call for analysis by capillary gas chromatography. Some methods suggest using a confirmational column to verify identities of organic compounds found in a sample. Most methods call for detection by conventional means (electron capture, nitrogen-phosphorus, photoionization, etc.) but some call for mass spectrometry. Volatile organic compounds can be analyzed with photoionization and electrolytic/conductivity detection, in series (Method 502.2), or by GC/mass spectrometry (Method 524.2). Two methods (Method 531.1 for carbamate herbicides and Method 547 for glyphosphates) call for analysis by HPLC, with a postcolumn reaction system as part of the detection process. Methods 549.1 and 550 also specify HPLC.

### Sample Preparation

Organic pollutants in drinking water samples normally are present in parts-per-billion or lower concentrations, and must be concentrated prior to chromatographic analysis. Volatile organics are purged from the sample and trapped on solid adsorbents (methods 502.2 and 524.2), then rapidly heat desorbed from the trap onto the chromatographic column. Recommended traps are described for each method. Nonvolatile organics are extracted in solvent or, in one method, by solid phase extraction (Method 525). Extraction techniques and cleanup procedures are described in detail in the EPA methodology.

Previous EPA restrictions limited the use of adsorbents for collecting volatile organic compounds (VOCs) to those specified in the method. Now the EPA officially allows the use of alternative adsorbents. This allowance is published in the Federal Register (59 FR 62456-71), which lists changes to several EPA methods contained in the document, *Technical Note for Drinking Water Meth-*

*ods* (Technical Notes) (2). This Technical Note amends two methods with the following sentence:

The use of alternative sorbents is acceptable provided the data acquired meets all quality control criteria described in section 10, and provided the purge and desorption procedures specified in section 11 of the method are not changed.

This sentence is added to Method 502.2, Rev. 2.0, at the end of Section 6.2.2, and replaces the last sentence in Method 524.2, Rev. 4.0, in Section 6.2.2.

Anticipating these allowances in future methods, scientists now can look at ways to greatly enhance the performance of their system by the selection of modern adsorbents. The VOCARB™ 4000 purge trap contains a combination of carbon adsorbents that efficiently trap and release the broad range of analytes in methods 502.2 and 524.2. Excellent thermal stability of the adsorbents in the trap allows higher desorption temperatures (250°C), with less background contamination, than traps specified in the methods, providing more rapid transfer of analytes and improved chromatography.

### Chromatography

Supelco columns and packings were used to obtain most of the chromatograms in this bulletin. Supelco products are listed by name in many of these EPA methods. For most of the other methods, Supelco materials are generically equivalent alternatives to listed materials. Specific testing for environmental applications ensures consistent performance from these products.

VOCOL™ capillary columns are tested specifically for analyses of volatile priority pollutants in wastewater, according to EPA methods 601, 602, and 624. Thus, they are ideal for monitoring these same compounds in drinking water at all stages of treatment. A 0.75mm ID VOCOL column is listed in EPA Method 524.2. Because 0.75mm ID VOCOL columns have high optimum carrier gas flow rates, analytes can be desorbed directly from the adsorbent trap to the column. In contrast, sample cryofocusing is necessary with narrower bore columns. In addition, 0.75mm ID VOCOL columns can be used with either capillary or packed column injection systems and detectors.

PTE™-5 capillary columns are tested specifically for analyses of acidic and basic organic compounds in water. These inert, 0.25mm ID columns are excellent for analyses of nitrogen- and phosphorus-containing pesticides (Method 507) and chlorinated pesticides, herbicides, and PCBs (methods 508 and 515). Very low column bleed ensures minimal interference with analyte detection in GC/MS systems.

**Table 1. Regulated Drinking Water Compounds**

| Contaminants                       | Methods                              |
|------------------------------------|--------------------------------------|
| Benzene                            | 502.2, 524.2                         |
| Carbon tetrachloride               | 502.2, 524.2, 551                    |
| Chlorobenzene                      | 502.2, 524.2                         |
| 1,2-Dichlorobenzene                | 502.2, 524.2                         |
| 1,4-Dichlorobenzene                | 502.2, 524.2                         |
| 1,2-Dichloroethane                 | 502.2, 524.2                         |
| cis-Dichloroethylene               | 502.2, 524.2                         |
| trans-Dichloroethylene             | 502.2, 524.2                         |
| Dichloromethane                    | 502.2, 524.2                         |
| 1,2-Dichloropropane                | 502.2, 524.2                         |
| Ethylbenzene                       | 502.2, 524.2                         |
| Styrene                            | 502.2, 524.2                         |
| Tetrachloroethylene                | 502.2, 524.2, 551                    |
| 1,1,1-Trichloroethane              | 502.2, 524.2, 551                    |
| Trichloroethylene                  | 502.2, 524.2, 551                    |
| Toluene                            | 502.2, 524.2                         |
| 1,2,4-Trichlorobenzene             | 502.2, 524.2                         |
| 1,1-Dichloroethylene               | 502.2, 524.2                         |
| 1,1,2-Trichloroethane              | 502.2, 524.2                         |
| Vinyl chloride                     | 502.2, 524.2                         |
| Xylenes (total)                    | 502.2, 524.2                         |
| 2,3,7,8-TCDD (Dioxin)              | 1613                                 |
| 2,4-D                              | 515.2, 555, 515.1                    |
| 2,4,5-TP (Silvex®)                 | 515.2, 555, 515.1                    |
| Alachlor                           | 505 <sup>■</sup> , 507, 525.2, 508.1 |
| Atrazine                           | 505 <sup>■</sup> , 507, 525.2, 508.1 |
| Benzo(a)pyrene                     | 525.2, 550, 550.1                    |
| Carbofuran                         | 531.1, 6610                          |
| Chlordane                          | 505, 508, 525.2, 508.1               |
| Dalapon                            | 552.1, 515.1                         |
| Di(2-ethylhexyl)adipate            | 506, 525.2                           |
| Di(2-ethylhexyl)phthalate          | 506, 525.2                           |
| Dibromochloropropane               | 504.1, 551                           |
| Dinoseb                            | 515.2, 555, 515.1                    |
| Diquat                             | 549.1                                |
| Endothall                          | 548.1                                |
| Endrin                             | 505, 508, 525.2, 508.1               |
| Ethylene dibromide                 | 504.1, 551                           |
| Glyphosate                         | 547, 6651                            |
| Heptachlor                         | 505, 508, 525.2, 508.1               |
| Heptachlor epoxide                 | 505, 508, 525.2, 508.1               |
| Hexachlorobenzene                  | 505, 508, 525.2, 508.1               |
| Hexachlorocyclopentadiene          | 505, 525.2, 508, 508.1               |
| Lindane                            | 505, 508, 525.2, 508.1               |
| Methoxychlor                       | 505, 508, 525.2, 508.1               |
| Oxamyl                             | 531.1, 6610                          |
| PCBs                               |                                      |
| as Decachlorobiphenyl <sup>▲</sup> | 508A                                 |
| as Aroclors                        | 505, 508                             |
| Pentachlorophenol                  | 515.2, 525.2, 555, 515.1             |
| Picloram                           | 515.2, 555, 515.1                    |
| Simazine                           | 505 <sup>■</sup> , 507, 525.2, 508.1 |
| Toxaphene                          | 505, 508, 525.2                      |
| Trihalomethanes (total)            | 502.2, 524.2, 551                    |

<sup>■</sup> If lower detection limits of alachlor, atrazine, and simazine are required, a nitrogen-phosphorous detector should be substituted for the electron capture detector in Method 505; or, another approved method should be used.

<sup>▲</sup>PCBs are qualitatively identified as Aroclors and measured for compliance purposes as decachlorobiphenyl using Method 508A.

\*Regulations specified by the US EPA require monitoring for certain contaminants to which maximum contaminant levels do not apply. These chemicals are called "unregulated" contaminants, and presently include sulfate, 34 volatile organic chemicals (VOCs) and 13 synthetic organic chemicals (SOCs).

**Table 2. Unregulated Drinking Water Compounds\***

| VOC Contaminants          | Methods             |
|---------------------------|---------------------|
| Chloroform                | 502.2, 524.2, 555   |
| Bromodichloromethane      | 502.2, 524.2, 551   |
| Bromoform                 | 502.2, 524.2, 551   |
| Chlorodibromomethane      | 502.2, 524.2, 551   |
| Bromobenzene              | 502.2, 524.2        |
| Bromochloromethane        | 502.2, 524.2        |
| Bromomethane              | 502.2, 524.2        |
| n-Butylbenzene            | 502.2, 524.2        |
| sec-Butylbenzene          | 502.2, 524.2        |
| tert-Butylbenzene         | 502.2, 524.2        |
| Chloroethane              | 502.2, 524.2        |
| Chloromethane             | 502.2, 524.2        |
| o-Chlorotoluene           | 502.2, 524.2        |
| p-Chlorotoluene           | 502.2, 524.2        |
| Dibromomethane            | 502.2, 524.2        |
| m-Dichlorobenzene         | 502.2, 524.2        |
| Dichlorodifluoromethane   | 502.2, 524.2        |
| 1,1-Dichloroethane        | 502.2, 524.2        |
| 1,3-Dichloropropane       | 502.2, 524.2        |
| 2,2-Dichloropropane       | 502.2, 524.2        |
| 1,1-Dichloropropene       | 502.2, 524.2        |
| 1,3-Dichloropropene       | 502.2, 524.2        |
| Fluorotrichloromethane    | 502.2, 524.2        |
| Hexachlorobutadiene       | 502.2, 524.2        |
| Isopropylbenzene          | 502.2, 524.2        |
| p-Isopropyltoluene        | 502.2, 524.2        |
| Naphthalene               | 502.2, 524.2        |
| n-Propylbenzene           | 502.2, 524.2        |
| 1,1,2,2-Tetrachloroethane | 502.2, 524.2        |
| 1,1,1,2-Tetrachloroethane | 502.2, 524.2        |
| 1,2,3-Trichlorobenzene    | 502.2, 524.2        |
| 1,2,3-Trichloropropane    | 502.2, 524.2, 504.1 |
| 1,2,4-Trimethylbenzene    | 502.2, 524.2        |
| 1,3,5-Trimethylbenzene    | 502.2, 524.2        |

| SOC Contaminants    | Methods                |
|---------------------|------------------------|
| Aldicarb            | 531.1, 6610            |
| Aldicarb sulfone    | 531.1, 6610            |
| Aldicarb sulfoxide  | 531.1, 6610            |
| Aldrin              | 505, 508, 525.2, 508.1 |
| Butachlor           | 507, 525.2             |
| Carbaryl            | 531.1, 6610            |
| Dicamba             | 515.1, 515.2, 555      |
| Dieldrin            | 505, 508, 525.2, 508.1 |
| 3-Hydroxycarbofuran | 531.1, 6610            |
| Methomyl            | 531.1, 6610            |
| Metolachlor         | 507, 525.2, 508.1      |
| Metribuzin          | 507, 525.2, 508.1      |
| Propachlor          | 508, 525.2, 508.1      |

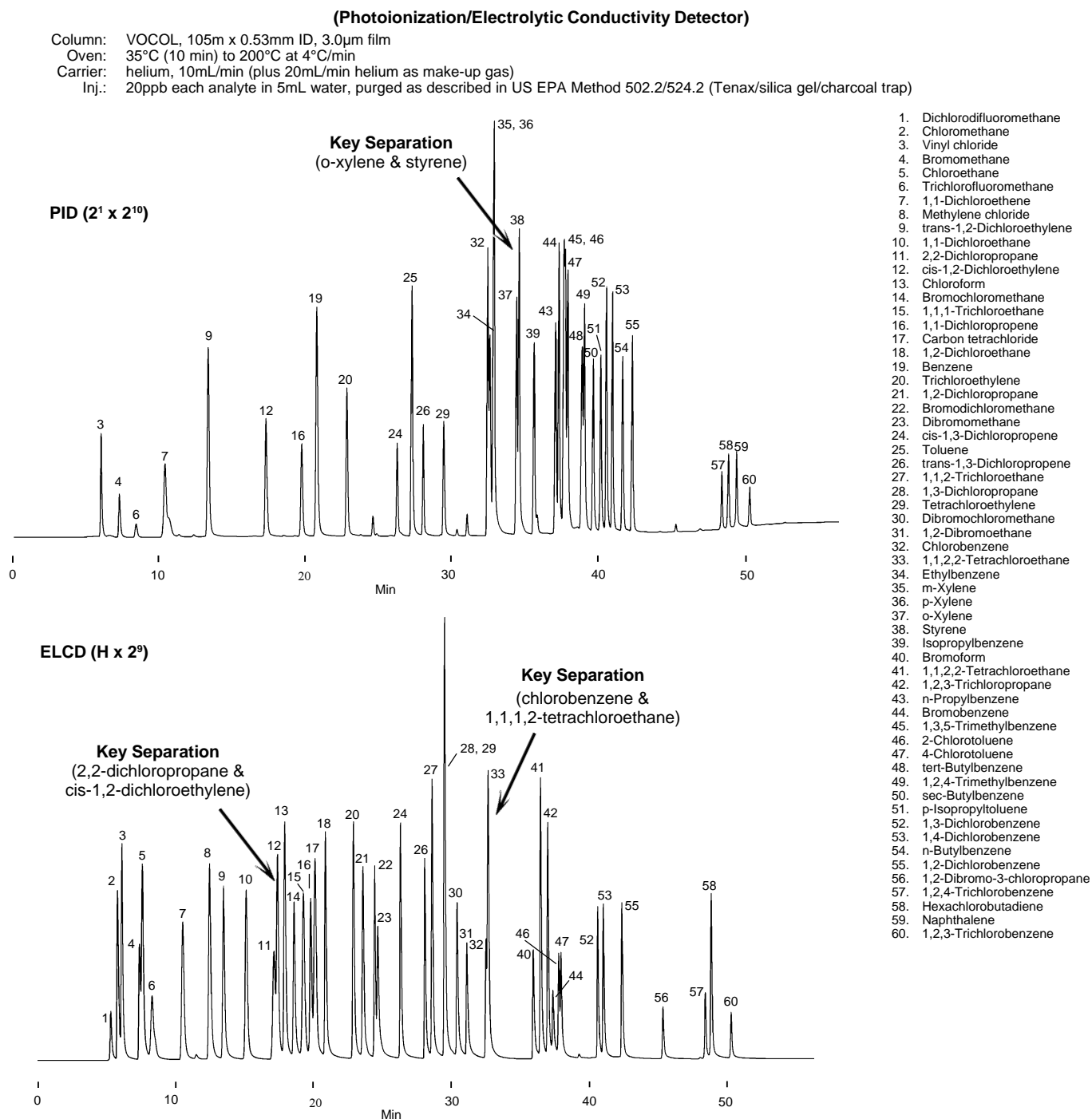
**References**

1. Methods 502.2, 505, 507, 508, 508A, 515.1, and 531.1 are in *Methods for the Determination of Organic Compounds in Drinking Water*. Order number PB 91-231480.  
Methods 506, 547, 550, 508, 550.1, and 551 are in *Methods for the Determination of Organic Compounds in Drinking Water — Supplement II*. Order number PB 91-146027.  
Methods 515.2, 524.2, 548.1, 549.1, 552.1, and 555 are in *Methods for the Determination of Organic Compounds in Drinking Water — Supplement II*. Order number PB 92-207703.  
Methods 502.1 and 503.1 are replaced by Method 502.2, effective 7/1/96.  
Method 524.1 is replaced by Method 524.2 effective 7/1/96.  
Current methods are available from NTIS, 5285 Port Royal Road, Springfield, VA 22161.
2. National Technical Information Service, US Department of Commerce, *Technical Note for Drinking Water*, NTIS Document #PB95-104766, NTIS, 5285 Port Royal Road, Springfield, VA 22161 USA. Phone 800-553-6847.

\*Methods listed in this bulletin are included in reference 1. Obtain methods for other compounds separately from the same source.

## Method 502.2 – Volatile Organics (Replaces Methods 502.1 and 503.1)

**Figure A. Volatile Compounds by Method 502.2**



Purge and Trap Concentrator: O.I. Analytical Corporation Model 4460A  
 Tandem PID/ELCD detector: O.I. Analytical Corporation Model 4440  
 Chromatograms provided courtesy of O.I. Analytical, College Station, TX.

713-1165, 1166

**Sample Preparation:** Purge and trap using a VOCARB 4000 trap (8.5cm Carbopack™ C/10cm Carbopack B/6cm Carboxen 1000/1cm Carboxen 1001).

**GC Column:** VOCOL wide bore capillary column, 105m x 0.53mm ID fused silica, 3.0µm phase film.

**Confirmational Column:** None listed.

**Detector:** Photoionization and electrolytic/conductivity, in series.

**Chemical Standards:** See page 13.

**Qualifications:** Current EPA regulations require water utilities to monitor for 49 volatile compounds (27 are unregulated) which could be monitored with a VOCOL column.

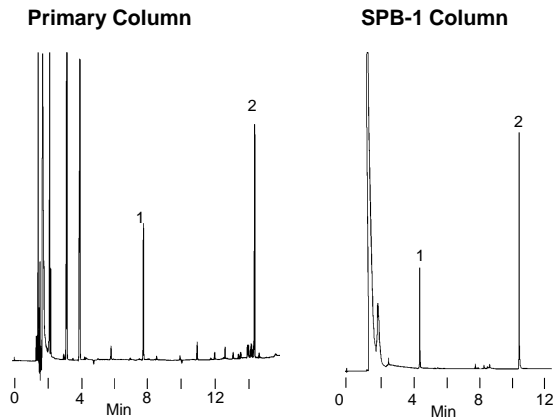
Also see listings for Method 524.2.

## Method 504 – 1,2-Dibromoethane and 1,2-Dibromo-3-chloropropane

**Figure B. Ethylene Dibromide and Dibromochloropropane by Method 504**

Column: *Primary* – SPB-1/Carbowax 20M (25:75), 30m x 0.32mm ID, 0.25µm film  
*SPB-1 Column* – 30m x 0.32mm ID, 0.25µm film  
Oven: 40°C (4 min) to 190°C at 8°C/min  
Carrier: helium, 25cm/sec  
Det.: ECD,  $4 \times 10^{-11}$  (primary column) or  $128 \times 10^{-11}$  AFS  
Inj.: 1µL hexane containing 2ng each analyte, split 100:1

1. Ethylene dibromide
2. Dibromochloropropane



796-0317, 0318

**Sample Preparation:** Extract with hexane.

**GC Column:** SPB™-1 methyl polysiloxane/Carbowax® 20M polyethylene glycol capillary column (25:75), 30m x 0.32mm ID fused silica, 0.25µm film.

**Confirmational Column:** SPB-1 capillary column, 30m x 0.32mm ID fused silica, 1.0µm phase film. Figure B shows a 30m x 0.32mm ID, 0.25µm film SPB-1 column also provides excellent results.

**Detector:** Electron capture.

**Chemical Standard:** EPA EDB/DBCP Mix.

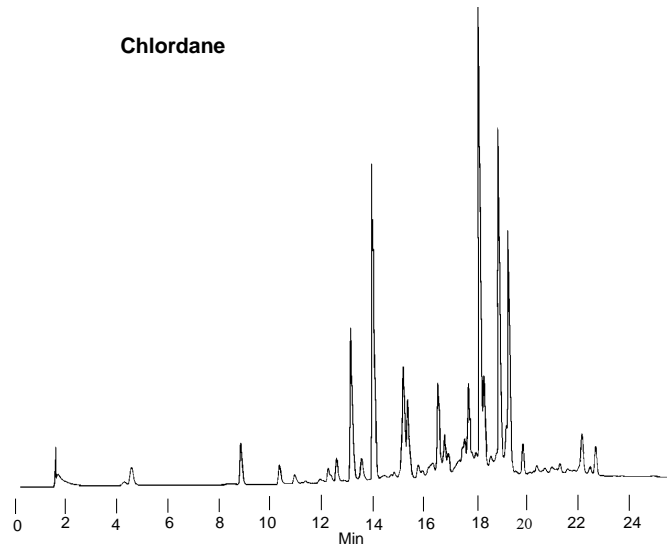
**Qualifications:** The capillary GC system must be equipped with a splitless injector.

## Method 505 – Organohalide Pesticides & PCBs/Microextraction GC/ECD

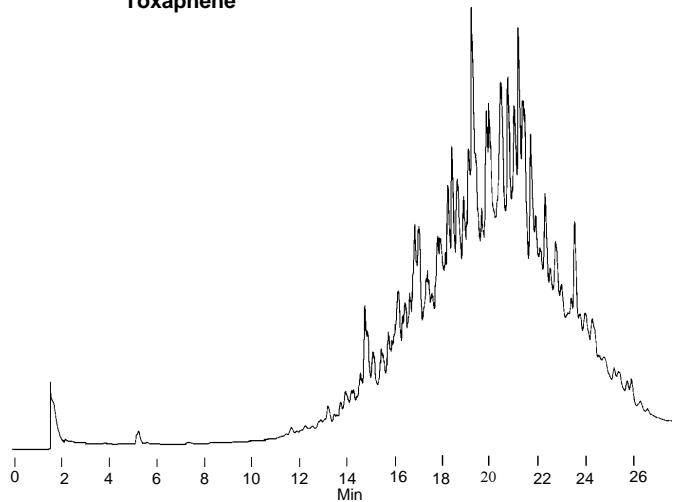
**Figure C. Chlordane or Toxaphene by Method 505**

Column: SPB-1, 30m x 0.32mm ID, 1.0µm film  
Oven: 180°C to 260°C at 4°C/min  
Carrier: helium, 25cm/sec  
Det.: ECD, 32 (chlordane) or  $16 \times 10^{-11}$  AFS  
Inj.: 1µL hexane containing 2ng each analyte, split 100:1

### Chlordane



### Toxaphene

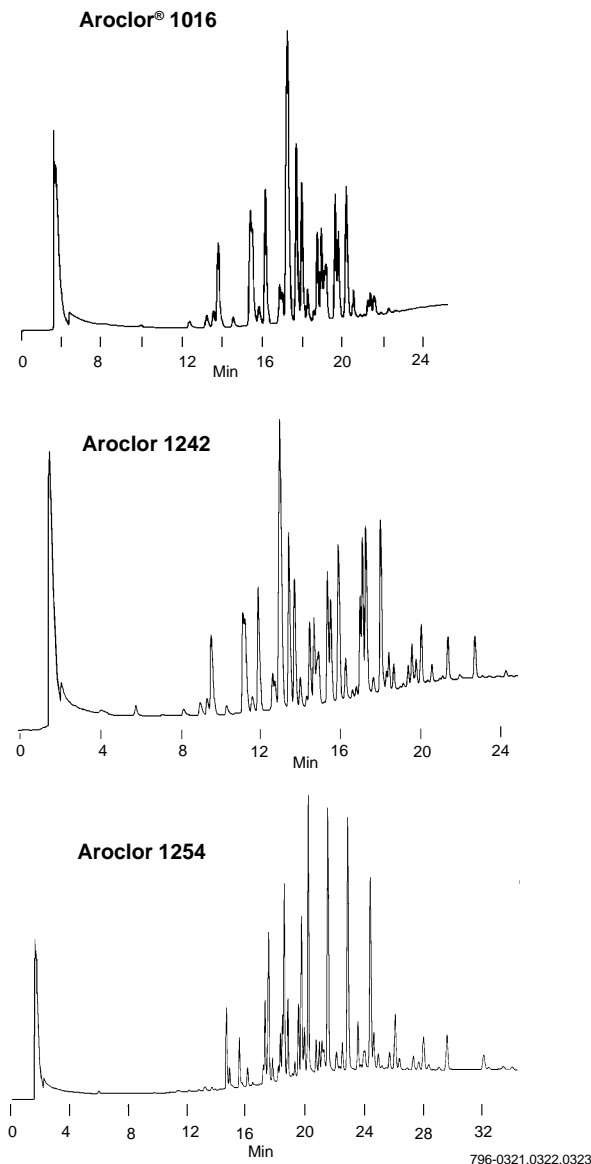


796-0319, 0320

Method 505 contd. on next page.

## Figure D. Polychlorinated Biphenyls Mixtures by Method 505

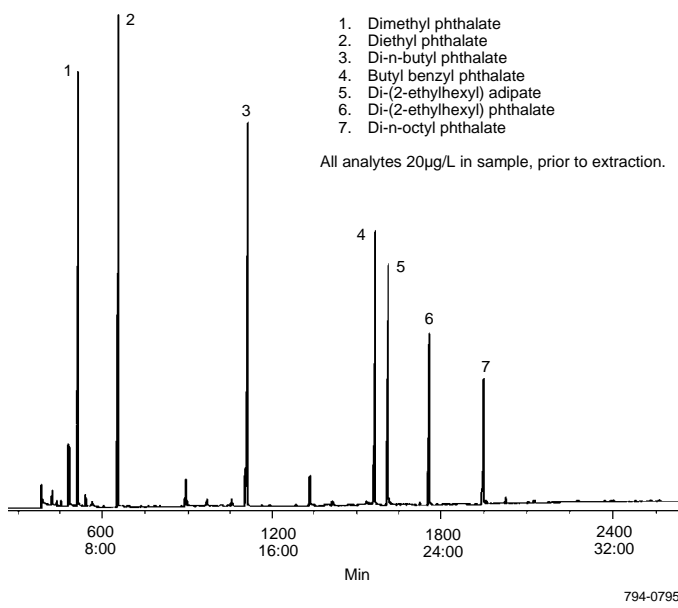
Column: SPB-1, 30m x 0.32mm ID, 1.0µm film  
 Oven: 180°C to 260°C at 4°C/min  
 Carrier: helium, 25cm/sec  
 Det.: ECD, 4 x 10<sup>-11</sup> AFS  
 Inj.: 1µL hexane containing 2ng Aroclor PCBs mixture, split 100:1



## Method 506 – Phthalate and Adipate Esters

### Figure E. Phthalate and Adipate Esters

Sample: 1L drinking water, add 5mL methanol and mix thoroughly  
 Extraction Disk: ENVI-18 DSK, 47mm  
 Conditioning: 5mL dichloromethane (pull completely through disk)  
 5mL methanol (do not allow disk to dry out)  
 5mL reagent water  
 Sample Addition: adjust vacuum to flow rate of 100mL/min  
 Extraction: rinse sample container with 5mL acetonitrile,  
 extract disk with solution, rinse container with  
 2 x 5mL dichloromethane, extract disk with solution  
 Column: 5% diphenyl/95% dimethyl silicone capillary (PTE-5  
 equivalent), 30m x 0.25mm ID, 0.25µm film  
 Oven: 40°C (1 min) to 160°C (3 min),  
 then to 300°C (3 min) at 6°C/min  
 Carrier: helium, 30cm/sec  
 Det.: MS, scan range m/z=45-450  
 Inj.: 1µL, split/splitless, 45 sec delay, 240°C



**Sample Preparation:** ENVI™-18 DSK extraction disk, 47mm.

**GC Column:** 5% diphenyl/95% dimethyl silicone capillary, 30m x 0.25mm ID, 0.25µm film (PTE-5 equivalent).

**Confirmational Column:** SPB-1 capillary column, 30m x 0.32mm ID fused silica, 0.25µm phase film.

**Detector:** PID, 10 volt.

**Chemical Standards:** See page 13.

**Sample Preparation:** Extract with hexane.

**GC Column:** SPB-1 methyl polysiloxane capillary column, 30m x 0.32mm ID fused silica, 1.0µm phase film.

**Confirmational Column:** SPB-1/Carbowax 20M PEG (50:50) capillary column, 30m x 0.32mm ID fused silica, 0.25µm phase film, or Methyl/phenyl silicone (50:50) capillary column (e.g. SPB-50), 25m x 0.25mm ID fused silica, 1.5µm phase film.

**Detector:** Electron capture.

**Chemical Standards:** See page 13.

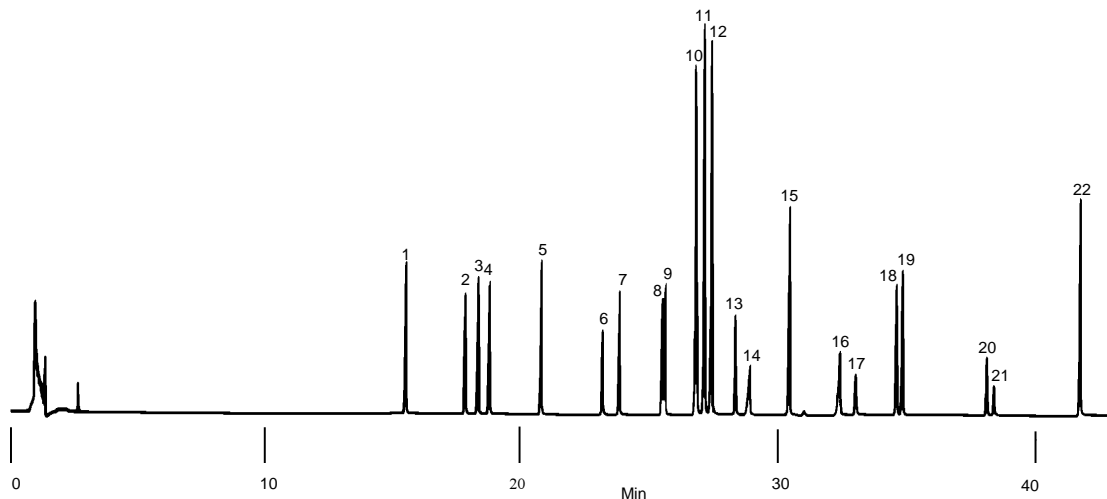
**Qualifications:** Either on-column or splitless injection may be used.

## Method 507 – Nitrogen- & Phosphorus-Containing Pesticides

**Figure F. Nitrogen-Containing Herbicides by Method 507**

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 60°C to 300°C at 4°C/min  
Carrier: helium, 30cm/sec  
Det.: TSD, 64 x 10<sup>-12</sup> AFS  
Inj.: 2µL ethyl acetate containing 5ng each herbicide, splitless

1. Eptam®
2. Sutan®
3. Vernam®
4. Tillam®
5. Ordram®
6. Propachlor
7. Ro-Neet®
8. Treflan®
9. Balan®
10. Simazine
11. Atrazine
12. Propazine
13. Tolban®
14. Terbacil
15. Sencor®
16. Bromacil
17. Dual®
18. Paarlan®
19. Prowl®
20. Oxadiazon
21. Goal®
22. Hexazinone

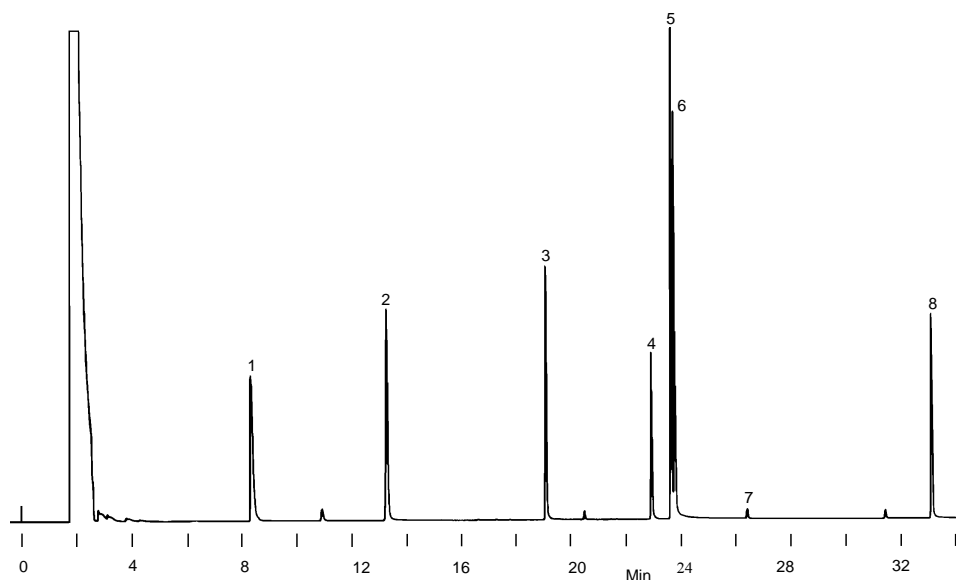


713-1062

**Figure G. Organophosphorus Compounds and Alachlor by Method 507**

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 100°C to 300°C at 4°C/min  
Carrier: helium, 20cm/sec  
Det.: TSD, 256 x 10<sup>-11</sup> AFS  
Inj.: 1µL methyl tertiary butyl ether containing 10ng each analyte, splitless

1. Dichlorvos
2. Mevinphos
3. Ethoprop
4. Terbufos
5. Disulfoton
6. Diazinon
7. Alachlor
8. Merphos



713-1063

**Sample Preparation:** Extract with methylene chloride, concentrate, transfer to methyl tert-butyl ether.

**GC Column:** PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:** SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Detector:** Nitrogen-phosphorus (NPD) or TSD.

**Chemical Standards:** See page 13.

**Qualifications:** Splitless injection is recommended.

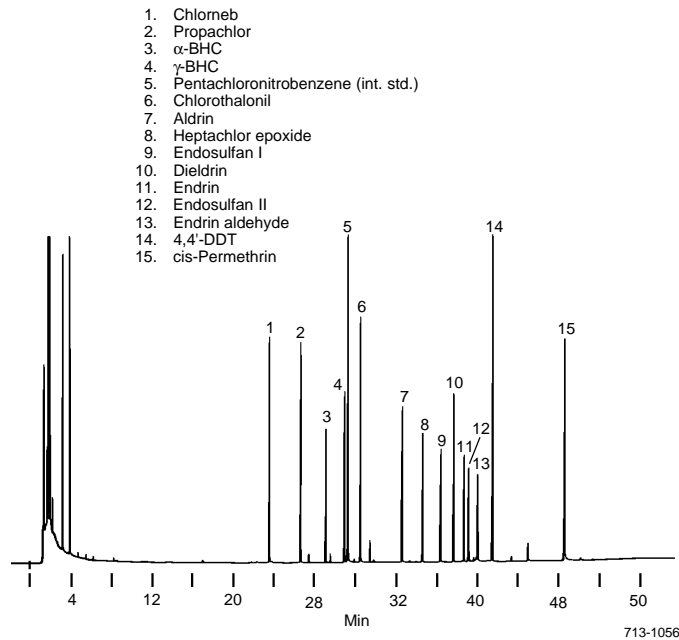
## Method 508 – Chlorinated Pesticides

### Method 508.1 – Chlorinated Pesticides

### Method 508A (screen test) — Perchlorinated PCBs

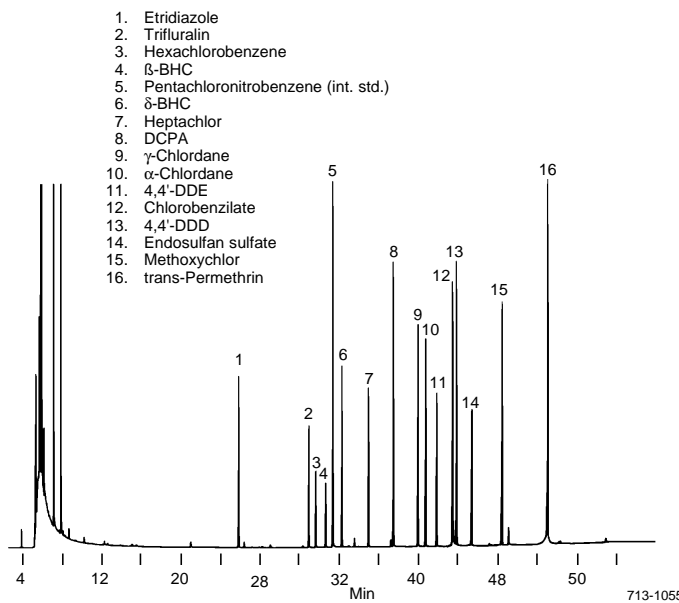
**Figure H. Chlorinated Pesticides by Method 508**

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 60°C to 300°C at 4°C/min  
Carrier: helium, 30cm/sec  
Det.: ECD, 32 x 10<sup>-11</sup> AFS  
Inj.: 2µL methyl tertiary butyl ether containing 20-2000pg each analyte, splitless



**Figure I. Chlorinated Pesticides by Method 508**

Conditions: same as Figure H



## Method 508

**Sample Preparation:** Extract 1 liter water sample with methylene chloride, concentrate, transfer to methyl tert-butyl ether.

**GC Column:** PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:** SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Detector:** Electron capture.

**Chemical Standards:** See page 14.

**Qualifications:** Refer to the EPA method for relative retention times for pesticides.

## Method 508A

**Sample Preparation:** Extract 1L water sample with methylene chloride, dry, concentrate, transfer to chloroform. Perchlorinate PCBs to decachlorobiphenyl for GC confirmation.

**GC Column:** PTE-5 capillary column, 30m x 0.32mm ID fused silica, 0.25µm phase film.

**Detector:** Electron capture.

**Chemical Standards:** See page 14.

## Method 515.1 (revision 4) – Chlorinated Herbicides

### Method 515.2– Chlorinated Acids

**Sample Preparation:**

**515.1:** 1 liter sample volume adjusted to pH 12; extract in ethyl ether before conversion to methyl esters with diazomethane.

**515.2:** 250mL sample volume; extract acids with 47mm resin disk.

**GC Column:**

PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:**

SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

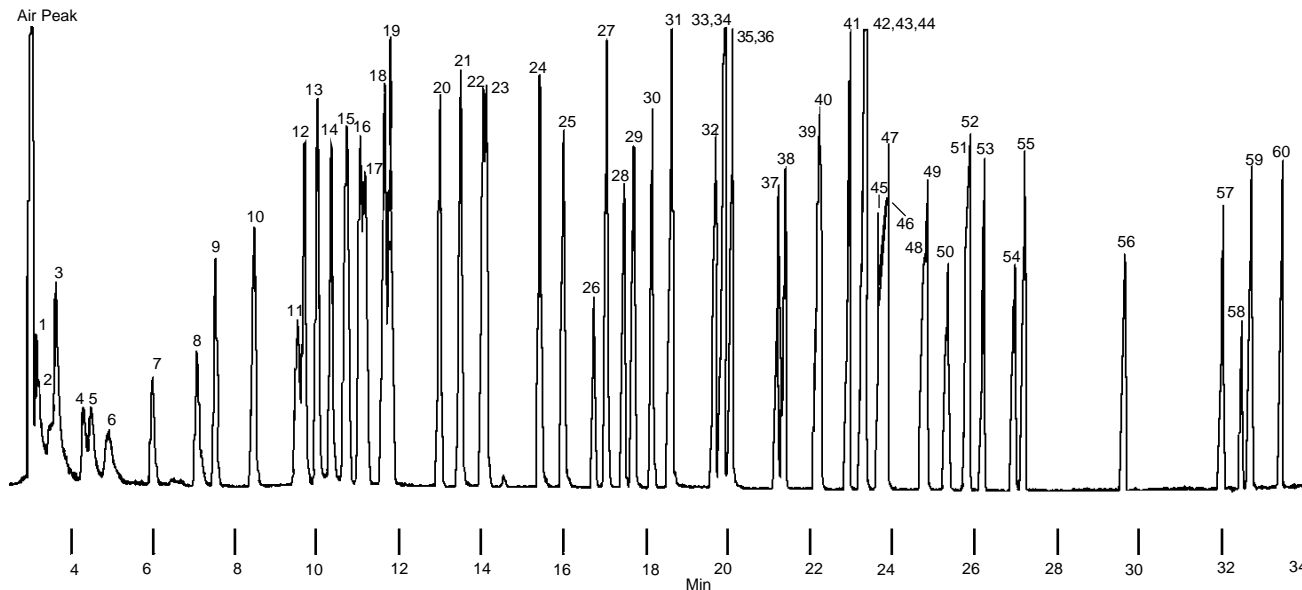
## Method 524.2 – Purgeable Organics (GC/MS) (Replaces Method 524.1)

**Figure J. Purgeable Organics by Method 524.2**

(Using Tekmar® LCS 2000 Purge & Trap and GC/MS)

Column: VOCOL, 60m x 0.75mm ID, 1.5µm film  
Oven: 10°C (4 min) to 170°C at 4°C/min  
Carrier: 10mL/min  
Det.: MS, scan range m/z=33-275, 1 scan/0.700 sec  
Inj.: composite of VOC mixes, 100ppb each compound in 5mL water

- |                             |                               |                               |                              |
|-----------------------------|-------------------------------|-------------------------------|------------------------------|
| 1. Dichlorodifluoromethane  | 16. 1,1-Dichloropropene       | 31. 1,2-Dibromoethane         | 46. 1,2,4-Trimethylbenzene   |
| 2. Chloromethane            | 17. Tetrachloromethane        | 32. Chlorobenzene             | 47. 4-Chlorotoluene          |
| 3. Vinyl chloride           | 18. Benzene                   | 33. 1,1,1,2-Tetrachloroethane | 48. tert-Butylbenzene        |
| 4. Bromomethane             | 19. 1,2-Dichloroethane        | 34. Ethyl benzene             | 49. 1,2,4-Trimethylbenzene   |
| 5. Chloroethane             | 20. Trichloroethene           | 35. p-Xylene                  | 50. sec-Butylbenzene         |
| 6. Trichlorofluoromethane   | 21. 1,2-Dichloropropane       | 36. m-Xylene                  | 51. Isopropyltoluene         |
| 7. 1,1-Dichloroethene       | 22. Bromodichloromethane      | 37. o-Xylene                  | 52. 1,3-Dichlorobenzene      |
| 8. Dichloromethane          | 23. Dibromomethane            | 38. Styrene                   | 53. 1,4-Dichlorobenzene      |
| 9. trans-1,2-Dichloroethene | 24. cis-1,3-Dichloropropene   | 39. Bromoform                 | 54. Butylbenzene             |
| 10. 1,1-Dichloroethane      | 25. Toluene                   | 40. Isopropylbenzene          | 55. 1,2-Dichlorobenzene      |
| 11. 2,2-Dichloropropane     | 26. trans-1,3-Dichloropropene | 41. 1,1,2,2-Tetrachloroethane | 56. 1,2-Dibromochloropropane |
| 12. cis-1,2-Dichloroethene  | 27. 1,1,2-Trichloroethane     | 42. Bromobenzene              | 57. 1,2,4-Trichlorobenzene   |
| 13. Trichloromethane        | 28. Tetrachloroethene         | 43. 1,2,3-Trichloropropane    | 58. Hexachlorobutadiene      |
| 14. Bromochloromethane      | 29. 1,3-Dichloropropane       | 44. Propylbenzene             | 59. Naphthalene              |
| 15. 1,1,1-Trichloroethane   | 30. Dibromochloromethane      | 45. 2-Chlorotoluene           | 60. 1,2,3-Trichlorobenzene   |



796-0324

**Sample Preparation:** Purge and trap using a VOCARB 4000 trap (8.5cm Carboxen 1000 / 10cm Carboxen B / 6cm Carboxen 1000 / 1cm Carboxen 1001).

**GC Column:** VOCOL wide bore capillary column, 60m x 0.75mm ID borosilicate glass, 1.5µm phase film.

**Confirmational Column:** VOCOL wide bore capillary column, 30m x 0.53mm ID fused silica, 3µm phase film.

**Detector:** Mass spectrometer (70eV, 35-260amu scanning capability).

**Chemical Standards:** See page 14.

**Qualifications:** When used with this method, 30m x 0.53mm ID capillary columns must be cooled to temperatures below 10°C.



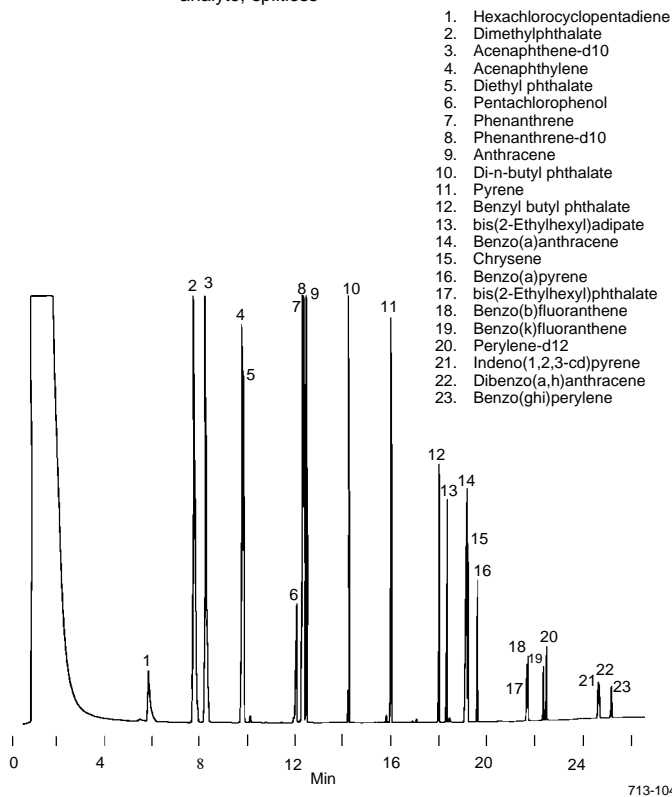
## Method 525 – General Purpose Organics

### Method 525.1 – General Purpose Organics

### Method 525.2 – General Purpose Organics

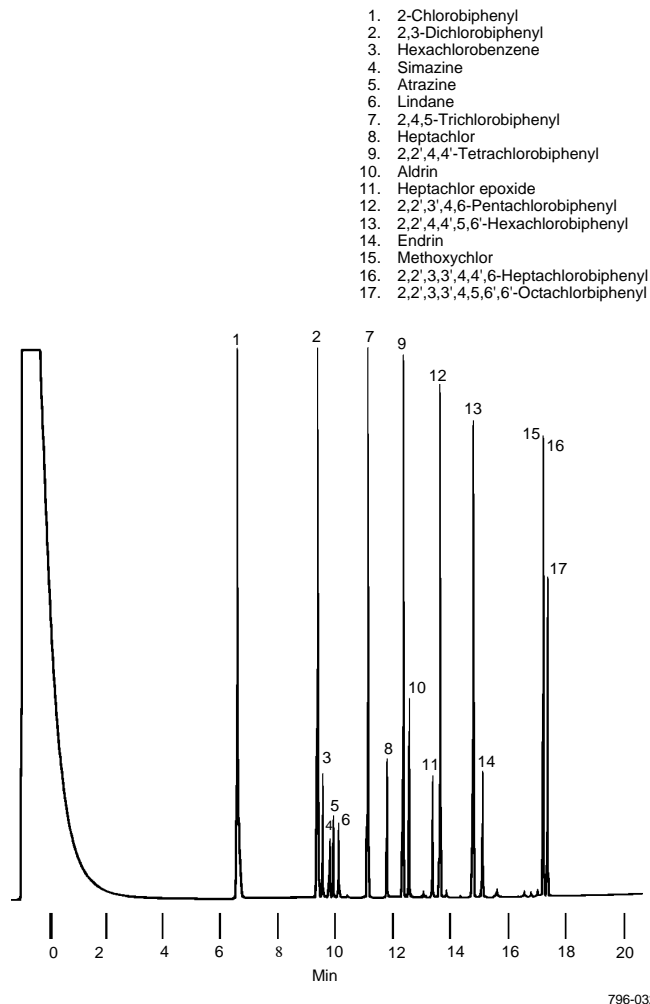
#### Figure K. General Purpose Organic Compounds by Method 525

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 120°C (4 min) to 320°C at 10°C/min  
(Trap Desorption Temp.: 240°C)  
Carrier: helium, 40cm/sec  
Det.: FID (32 x 10<sup>-11</sup> AFS)  
Inj.: 1µL methanol/methylene chloride containing 100ng each analyte, splitless



#### Figure L. General Purpose Organic Compounds by Method 525

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 120°C (4 min) to 320°C at 10°C/min  
(trap desorbed at 240°C)  
Carrier: helium, 40cm/sec  
Det.: FID (32 x 10<sup>-11</sup> AFS)  
Inj.: 1µL methanol/methylene chloride containing 100ng each pesticide, 250ng each PCB, splitless



#### Sample Preparation:

**525:** Extract 1 liter water sample on ENVI-18 solid phase extraction tube, recover in methylene chloride.

**525.1:** Extract on ENVI-18 solid phase extraction tube or extraction disk, recover in methylene chloride.

**525.2:** Extract on ENVI-18 solid phase extraction tube or extraction disk, recover in ethyl acetate followed by methylene chloride.

**GC Column:** PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:** None listed.

**Detector:** Mass spectrometer (70eV, 45-450amu scanning capability).

**Chemical Standards:** See page 14.

## Method 531.1 – N-Methyl Carbomoyloximes & N-Methyl Carbamates

**Sample Preparation:** Direct injection.

**HPLC Column:** SUPELCO<sup>SM</sup> LC-18, 15cm x 4.6mm ID, 5µm packing.

**Confirmational Column:** None listed.

**Detector:** Fluorescence (postcolumn derivatization of analytes to methyl amines with o-phthalaldehyde and 2-mercaptoethanol).

**Chemical Standards:** Custom prepared mix.

**Qualifications:** A postcolumn reaction system is required.

## Method 548.1 – Endothall

**Sample Preparation:** 100mL sample extracted using an SPE tube (8mL) using ion exchange or extraction disk.

**GC Column:** PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:** VOCOL, 30m x 0.53mm ID fused silica, 3µm film.

**Detector:** FID or mass spectrometry.

**Chemical Standards:** Custom prepared mix.

## Method 549.1 – Diquat and Paraquat

### Figure M. Diquat and Paraquat by Method 549.1

**Sample:** 250mL drinking water, adjust sample pH to 10.5 ± 0.2 with sodium hydroxide solution (10% w/v) or hydrochloric acid solution (10% v/v)

**Extraction Disk:** ENVI-8 DSK, 47mm

**Conditioning:** 10mL methanol  
2 x 10 mL reagent water  
10mL conditioning solvent A (0.5g cetyl trimethyl ammonium bromide and 5mL conc. ammonium hydroxide in 500mL water, dilute to 1L)  
2 x 10mL reagent water  
10mL conditioning solvent B (10.0g hexanesulfonic acid, sodium salt and 10mL ammonium hydroxide in 250mL deionized water, dilute to 500mL)

**Sample Addition:** adjust vacuum to flow rate of 100mL/min

**Extraction:** 0.5 to 1.0mL methanol (to cover disk)  
2 x 4mL eluting solution (13.5mL orthophosphoric acid and 10.3mL diethylamine in 500mL water, dilute to 1L)

**Column:** C18, 15cm x 4.6mm ID, 5µm particles

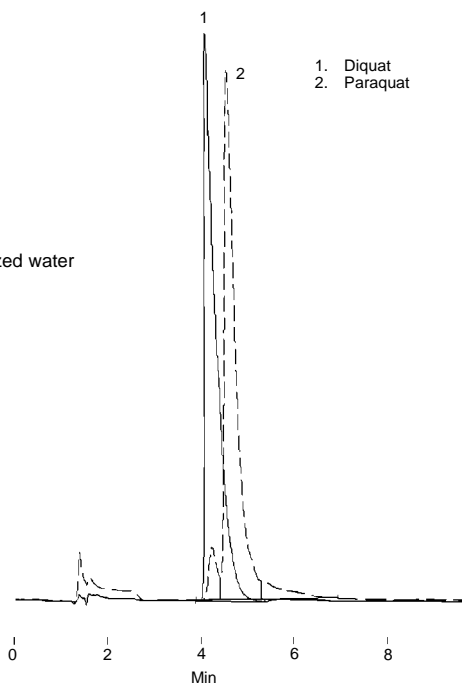
**Mobile Phase:** 3.5mL triethylamine and 1.0g 1-hexane-sulfonic acid, sodium salt to 800mL deionized water add orthophosphoric acid to pH = 2.5, dilute to 1L

**Flow Rate:** 1.0mL/min

**Temp.:** 35°C

**Det.:** Photodiode array, quantitate Diquat -308nm, Paraquat -257nm

**Inj.:** 100µL



794-0715

**Sample Preparation:** C8 SPE tube (500mg) or extraction disk.

**HPLC Column:** LC-18, 15m x 4.6mm ID, 5µm particles.

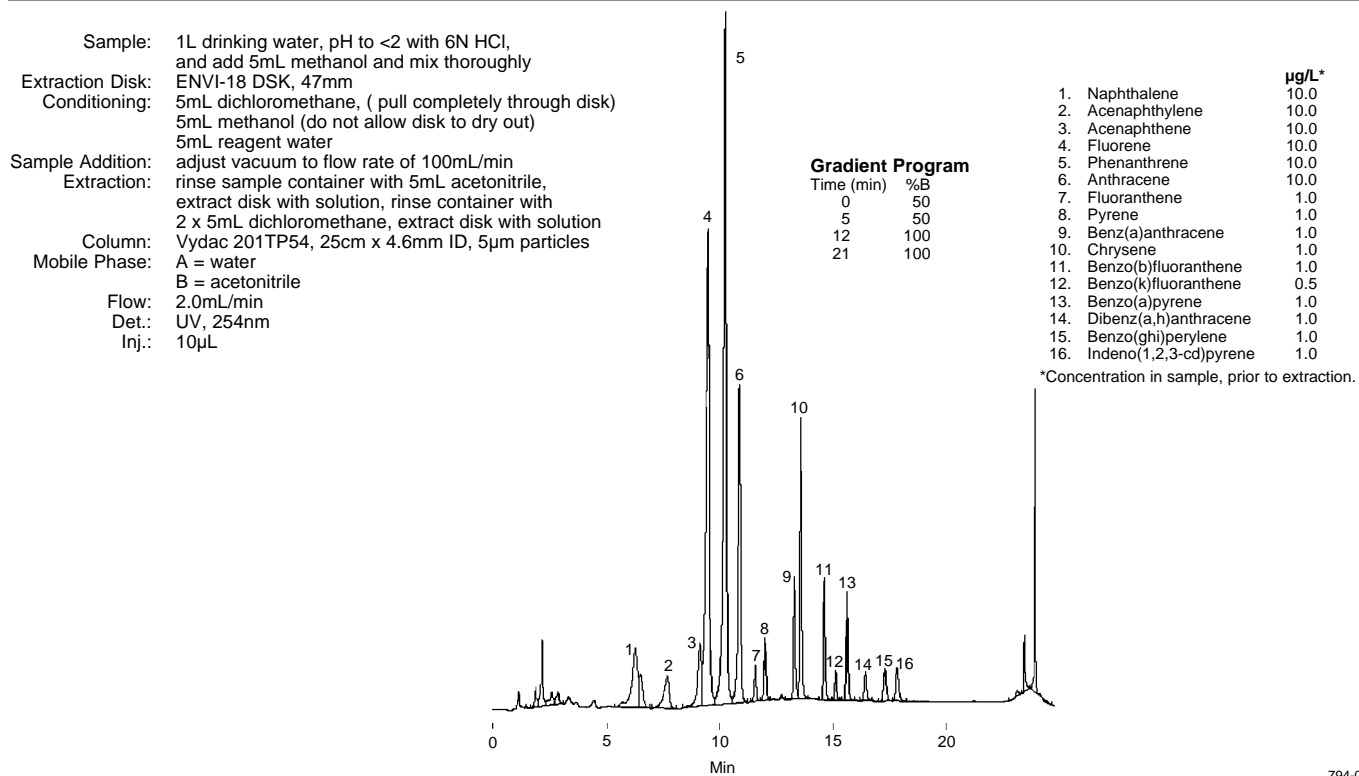
**Confirmational Column:** None listed.

**Detector:** Photodiode array, 308nm for diquat, 257nm for paraquat.

**Chemical Standards:** Custom prepared mix.

## Method 550.1 – Polycyclic Aromatic Hydrocarbons

**Figure N. Polycyclic Aromatic Hydrocarbons by Method 550.1**



**Sample Preparation:** ENVI-18 DSK extraction disk, 47mm.

**HPLC Column:** 25cm x 4.6mm ID, 5µm particles.

**Confirmational Column:** None listed.

**Detector:** UV, 254nm.

**Chemical Standards:** Custom prepared mix.

## Method 551 – Chlorinated Disinfection Byproducts and Chlorinated Solvents

**Sample Preparation:** 35mL sample extracted with 2mL methyl-tert-butyl ether.

**GC Column:** SPB-1 capillary column, 30m x 0.32mm ID fused silica, 1.0µm phase film.

**Confirmational Column:** SPB-2401 capillary column, 30m x 0.32mm ID fused silica, 0.5µm phase film.

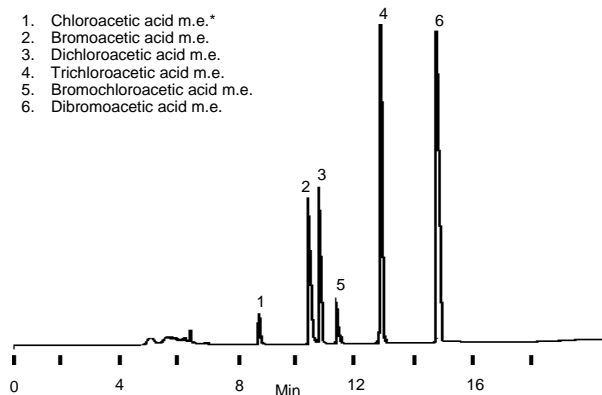
**Chemical Standards:** See page 15.

## Method 552.1 – Haloacetic Acids and Dalapon

## Method 552.2 – Haloacetic Acids and Dalapon

### Figure O. Haloacetic Acid Methyl Esters Using PTE-5 Column

Column: PTE-5, 30m x 0.25mm ID, 0.25µm film  
Oven: 50°C (10 min) to 200°C at 10°C/min  
Carrier: helium, 25cm/sec  
Det.: ECD, 300°C  
Inj.: 1µL MTBE (~0.02ng bromochloroacetic acid, other analytes 0.2ng), splitless, 200°C

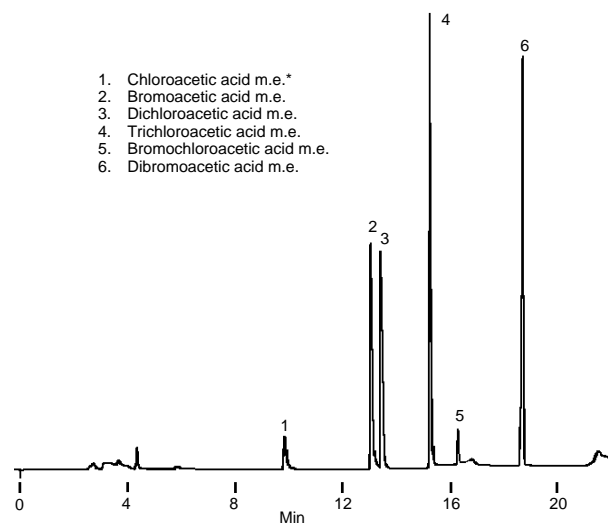


\*Compounds analyzed as diazomethane-derivatized methyl esters.

712-0129

### Figure P. Haloacetic Acid Methyl Esters Using SPB-1701 Column

Column: SPB-1701, 30m x 0.32mm ID, 0.25µm film  
Oven: 50°C (10 min) to 120°C at 10°C/min, hold 3 min  
Carrier: helium, 25cm/sec  
Det.: ECD, 300°C  
Inj.: 1µL MTBE (20ng/mL bromochloroacetic acid, all others 200ng/mL each), splitless 200°C



\*Compounds analyzed as diazomethane-derivatized methyl esters.

712-0128

**Sample Preparation:** 40mL sample is adjusted to pH <0.5, extracted with 4mL methyl tert-butyl ether.

**GC Column:** PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Confirmational Column:** SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm phase film.

**Detector:** Electron capture.

**Chemical Standards:** See page 15.

## Method 555 – Chlorinated Acids

**Sample Preparation:** 100mL sample adjusted to pH 12, 20mL aliquot extracted with C18 SPE tube or disk.

**HPLC Column:** SUPELCOSIL C18, 25cm x 4.6mm ID, 5µm particles.

**Confirmational Column:** None listed.

**Detector:** Photodiode array UV.

**Chemical Standards:** Custom prepared mix.

## Ordering Information:

| Product   | Description | Cat. No. |
|---|-------------|----------|
| <b>502.2 Volatile Organics</b>  |             |          |
| <b>Columns</b>  |             |          |
| VOCOL capillary column,<br>60m x 0.75mm ID glass, 1.5µm film  |             | 23731    |
| VOCOL capillary column,<br>105m x 0.53mm ID fused silica, 3µm film  |             | 25358    |
| VOCOL capillary column,<br>30m x 0.53mm ID fused silica, 3µm film   |             | 25320-U  |
| <b>Sample Preparation</b>   |             |          |
| VOCARB 4000 adsorbent trap, 30.5cm x 0.125" x 0.105" ID,<br>containing Carboxen C, Carboxen B,<br>Carboxen S-III adsorbents |             | 20308*   |
| <b>Calibration Standards<sup>▲</sup></b>  |             |          |
| VOC Calibration Standards Kit   |             | 48804    |
| Volatile Organic Compounds Mix 1, 1mL   |             | 48775*   |
| Volatile Organic Compounds Mix 2, 1mL   |             | 48777*   |
| Volatile Organic Compounds Mix 3, 1mL   |             | 48779*   |
| Volatile Organic Compounds Mix 4, 1mL   |             | 48786*   |
| Volatile Organic Compounds Mix 5, 1mL   |             | 48797*   |
| Volatile Organic Compounds Mix 6, 1mL   |             | 48799-U* |
| Volatile Organic Compounds Mix 7, 1mL   |             | 48802-U* |
| Volatile Organic Compounds Mix 8, 1mL   |             | 48803    |
| Volatile Organic Compounds Mix 9, 1mL   |             | 47399    |
| <b>Internal Standards<sup>▲</sup></b>   |             |          |
| 1-Chloro-2-fluorobenzene, 2000µg/mL in methanol, 1mL  |             | 48369    |
| 2-Bromo-1-chloropropane, 2000µg/mL in methanol, 1mL   |             | 48713    |
| 1,4-Dichlorobutane, 2000µg/mL in methanol, 1mL  |             | 48066    |
| EPA 502 Internal Standard Mix, 1mL  |             | 48950-U  |
| <b>504.1 1,2-Dibromoethane &amp; 1,2-Dibromo-3-chloropropane</b>  |             |          |
| <b>Columns</b>  |             |          |
| SPB-1/Carbowax 20M capillary column (25:75),<br>30m x 0.32mm ID fused silica, 0.25µm film                                   |             | custom   |
| SPB-1 capillary column, 30m x 0.32mm ID fused silica,<br>1.0µm film   |             | 24045-U  |
| VOCOL capillary column, 30m x 0.53mm ID fused silica,<br>3µm film   |             | 25320-U  |
| <b>Sample Preparation</b>   |             |          |
| Pre-assembled vials, 40mL, pk. of 100   |             | 27181    |
| <b>Calibration Standards<sup>▲</sup></b>  |             |          |
| EPA EDB/DBCP Mix, 1mL   |             | 48225-U  |
| <b>505 Organohalide Pesticides &amp; Polychlorinated Biphenyls (PCBs)</b>   |             |          |
| <b>Columns</b>  |             |          |
| SPB-1 capillary column, 30m x 0.32mm ID fused silica,<br>1.0µm film   |             | 24045-U  |
| SPB-1/Carbowax 20M capillary column (25:75),<br>30m x 0.32mm ID fused silica, 0.25µm film                                   |             | custom   |
| SPB-50 capillary column, 30m x 0.32mm ID fused silica,<br>1.5µm film  |             | custom   |
| <b>Sample Preparation</b>   |             |          |
| Pre-assembled vials, 40mL, pk. of 100   |             | 27181    |
| <b>Calibration Standards<sup>▲</sup></b>  |             |          |
| PCB Kit 3   |             | 48825    |
| EPA 505/525 Update Pesticides Mix A, 1mL  |             | 47727-U  |
| EPA 505/525 Update Pesticides Mix B, 1mL  |             | 47728-U  |
| Chlordane, 5000µg/mL in methanol, 1mL   |             | 40089    |
| α-Chlordane, 100µg/mL in hexane, 1mL  |             | 48192    |
| γ-Chlordane, 100µg/mL in hexane, 1mL  |             | 48193    |
| Toxaphene, 5000µg/mL in methanol, 1mL   |             | 40111    |

| Product  | Description | Cat. No. |
|--|-------------|----------|
| <b>506 Phthalate &amp; Adipate Esters</b>                                |             |          |
| <b>Columns</b>   |             |          |
| PTE-5 capillary column, 30m x 0.32mm ID fused silica,<br>0.25µm film     |             | 24143    |
| SPB-1 capillary column, 30m x 0.32mm ID fused silica,<br>0.25µm film     |             | 24044    |
| <b>Sample Preparation</b>  |             |          |
| ENVI-18 solid phase extraction tubes, 6mL (1g packing),<br>box of 30     |             | 57065    |
| ENVI-18 DSK extraction disks, 47mm, pk. of 24                            |             | 57171    |
| Sample bottle, amber glass, 32oz.,<br>with Teflon-lined screw cap        |             | 24559    |
| Separatory funnel, 2 liter, Teflon stopcock                              |             | 64806    |
| Kuderna-Danish macro concentrator,<br>w/ground joints, 500mL             |             | 64685-U  |
| <b>Calibration Standards<sup>▲</sup></b>                                 |             |          |
| EPA 506 Phthalate Esters Mix 1, 1mL                                      |             | 48223    |
| EPA Phthalate Esters Mix, 1mL  |             | 48805-U  |
| Di-n-octyl phthalate, 5000µg/mL in methanol, 1mL                         |             | 40067    |
| Di(2-ethylhexyl)phthalate, 2000µg/mL in methanol, 1mL                    |             | 47994    |
| Di(2-ethylhexyl)adipate, 2000µg/mL in methanol, 1mL                      |             | 47995-U  |
| <b>507 Nitrogen &amp; Phosphorus Pesticides</b>                          |             |          |
| <b>Columns</b>   |             |          |
| PTE-5 capillary column, 30m x 0.25mm ID fused silica,<br>0.25µm film     |             | 24135-U  |
| SPB-1701 capillary column, 30m x 0.25mm ID fused silica,<br>0.25µm film  |             | 24113    |
| <b>Sample Preparation</b>  |             |          |
| Sample bottle, amber glass, 32oz.,<br>with Teflon-lined screw cap        |             | 24559    |
| Separatory funnel, 2 liter, Teflon stopcock                              |             | 64806    |
| Kuderna-Danish macro concentrator,<br>with ground joints, 500mL          |             | 64685-U  |
| <b>Calibration Standards</b>   |             |          |
| custom prepared  |             | custom   |
| <b>Internal Standard</b>   |             |          |
| Triphenyl phosphate, 500µg/mL in methyl tert-butyl ether,<br>1mL         |             | 48064    |
| <b>Surrogate Standard</b>  |             |          |
| 1,3-Dimethyl-2-nitrobenzene, 250µg/mL in<br>methyl tert-butyl ether, 1mL |             | 48063    |
| <b>Performance Standard<sup>▲</sup></b>                                  |             |          |
| 507 Laboratory Performance Check Solution, 1mL                           |             | 48946    |

\*For Tekmar LSC purge/trap units. For traps for other models, refer to the Supelco catalog.

▲For a listing of the components of mixes and kits, refer to the Supelco catalog.

\*Separate source standard is available for this product.

| Product   | Description  | Cat. No.       | Product                                  | Description  | Cat. No.        |
|---|--|----------------|--|--|-----------------|
| <b>508, 508.1, 508A Chlorinated Pesticides &amp; PCBs</b> |  |                | <b>524.2 Purgeable Organics</b>          |  |                 |
| <b>Columns<sup>▲</sup></b>                                |  |                | <b>Columns</b>                           |  |                 |
|   | PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film    | <b>24135-U</b> |  | VOCOL capillary column, 60m x 0.75mm ID fused silica, 1.5µm film   | <b>23731</b>    |
|   | SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film | <b>24113</b>   |  | VOCOL capillary column, 30m x 0.53mm ID fused silica, 3µm film   | <b>25320-U</b>  |
| <b>Sample Preparation</b>                                 |  |                |  | PTE-5 capillary column, 30m x 0.32mm ID fused silica, 1µm film   | <b>24159</b>    |
|   | ENVI-18 solid phase extraction tubes, 6mL (0.5g packing), box of 30  | <b>57064</b>   | <b>Sample Handling</b>                   |  |                 |
|   | ENVI-18 solid phase extraction tubes, 6mL (1g packing), box of 30    | <b>57065</b>   |  | VOCARB 4000 adsorbent trap, 30.5cm x 0.125" x 0.105", containing Carbopack C, Carbopack B, & Carboxen 1000 | <b>20308*</b>   |
|   | Sample bottle, amber glass, 32 oz., with Teflon-lined screw cap      | <b>24559</b>   | <b>Calibration Standards<sup>▲</sup></b> |  |                 |
|   | Separatory funnel, 2 liter, Teflon stopcock                          | <b>64806</b>   |  | VOC Calibration Standards Kit  | <b>48804</b>    |
|   | Kuderna-Danish macro concentrator, with ground joints, 500mL         | <b>64685-U</b> |  | EPA 524 Volatile Organic Compounds Kit   | <b>47936</b>    |
| <b>Calibration Standards<sup>▲</sup></b>                  |  |                |  | EPA 524.2 Volatile Organic Compounds Mix, 1mL  | <b>47932</b>    |
|   | PCB Kit 3  | <b>48825-U</b> |  | EPA 524 Volatile Organic Compounds Mix A, 1mL  | <b>47933</b>    |
|   | TCL Pesticides Mix, 1mL  | <b>48913 ♦</b> |  | EPA 524 Volatile Organic Compounds Mix B, 1mL  | <b>47934</b>    |
|   | EPA Phase V 508 Pesticide/SOC MCL Mix, 1mL                           | <b>47361</b>   |  | Volatile Organic Compounds Mix 1, 1mL  | <b>48775*</b>   |
|   | Standard Mix A-1, 1mL  | <b>47977</b>   |  | Volatile Organic Compounds Mix 2, 1mL  | <b>48777*</b>   |
|   | Chlordane, 5000µg/mL in methanol, 1mL                                | <b>40089</b>   |  | Volatile Organic Compounds Mix 3, 1mL  | <b>48779*</b>   |
|   | α-Chlordane, 100µg/mL in hexane, 1mL                                 | <b>48192</b>   |  | Volatile Organic Compounds Mix 4, 1mL  | <b>48786*</b>   |
|   | γ-Chlordane, 100µg/mL in hexane, 1mL                                 | <b>48193</b>   |  | Volatile Organic Compounds Mix 5, 1mL  | <b>48797*</b>   |
|   | Toxaphene, 5000µg/mL in methanol, 1mL                                | <b>40111</b>   |  | Volatile Organic Compounds Mix 6, 1mL  | <b>48799-U*</b> |
| <b>Internal Standard</b>                                  |  |                | <b>Internal Standards<sup>▲</sup></b>    |  |                 |
|   | Pentachloronitrobenzene, 5000µg/mL in methanol, 1mL                  | <b>40156</b>   |  | Fluorobenzene, 2000µg/mL in methanol, 1mL  | <b>48943</b>    |
| <b>Surrogate Standard</b>                                 |  |                |  | EPA 524 Internal Standard Mix, 1mL   | <b>48948</b>    |
|   | 4,4'-Dichlorobiphenyl, 500µg/mL in isooctane, 1mL                    | <b>48260</b>   |  | EPA 524.2 Fortification Solution, 1mL  | <b>47358</b>    |
| <b>Performance Standards<sup>▲</sup></b>                  |  |                | <b>Surrogate Standards<sup>▲</sup></b>   |  |                 |
|   | DDT-Endrin Mix, 1mL  | <b>48282</b>   |  | EPA 524 Surrogate Standard Mix, 1mL  | <b>48466</b>    |
|   | EPA Pesticide-Herbicide QC Mix, 5mL                                  | <b>49145</b>   |  | 4-Bromofluorobenzene, 2000µg/mL in methanol, 1mL   | <b>48083</b>    |
| <b>515.1, 515.2 Chlorinated Herbicides</b>                |  |                |  | 1,2-Dichlorobenzene-d4, 1mL  | <b>48952</b>    |
| <b>Columns</b>  |  |                | <b>QC Standards<sup>▲</sup></b>          |  |                 |
|   | PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film    | <b>24135-U</b> |  | Discretionary Aromatic Volatiles Mix NC, 1mL <sup>■</sup>  | <b>47273</b>    |
|   | SPB-1701 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film | <b>24113</b>   |  | Volatile Organic Contaminants Mix 1 NC, 1mL <sup>■</sup>   | <b>47274</b>    |
| <b>Sample Handling</b>                                    |  |                |  | Volatile Organic Contaminants Mix 2 NC, 1mL <sup>■</sup>   | <b>47275</b>    |
|   | ENVI-18 solid phase extraction tubes, 6mL (0.5g packing), box of 30  | <b>57064</b>   |  |  |                 |
|   | ENVI-18 solid phase extraction tubes, 6mL (1g packing), box of 30    | <b>57065</b>   |  |  |                 |
|   | Sample bottle, amber glass, 32oz., with Teflon-lined screw cap       | <b>24559</b>   |  |  |                 |
|   | Separatory funnel, 2 liter, Teflon stopcock                          | <b>64806</b>   |  |  |                 |
|   | Kuderna-Danish macro concentrator, with ground joints, 500mL         | <b>64685-U</b> |  |  |                 |

\*For Tekmar LSC purge/trap units. For traps for other models, refer to the Supelco catalog.

▲For a listing of the components of mixes and kits, refer to the Supelco catalog.

♦Separate source standard is available for this product.

■This mix is the Supelco equivalent of the former EPA-certified QC sample.

| Product   | Description  | Cat. No. | Product   | Description  | Cat. No. |
|---|--|----------|---|--|----------|
| <b>525.2 General Purpose Organics</b>                         |  |          | <b>550, 550.1 Polycyclic Aromatic Hydrocarbons</b>  |  |          |
| <b>Column</b>   |  |          | <b>Column</b>   |  |          |
|   | PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film      | 24135-U  |   | SUPELCO SIL LC-PAH HPLC column, 25cm x 4.6mm ID, 5µm packing         | 58229    |
| <b>Sample Handling</b>  |  |          | <b>Sample Handling</b>  |  |          |
|   | ENVI-18 solid phase extraction tubes, 6mL (1g packing), box of 30      | 57065    |   | ENVI-18 solid phase extraction tubes, 6mL (1g packing), box of 30    | 57065    |
|   | ENVI-18 DSK extraction disks, 47mm, pk. of 24                          | 57171    |   | ENVI-18 DSK extraction disks, 47mm, pk. of 24                        | 57171    |
| <b>Calibration Standards<sup>▲</sup></b>                      |  |          |   | Sample bottle, amber glass, 32 oz., with Teflon-lined screw cap      | 24559    |
|   | EPA 505/525 Update Pesticide Mix A, 1mL                                | 47727-U  |   | Separatory funnel, 2 liter, Teflon stopcock                          | 64806    |
|   | EPA 505/525 Update Pesticide Mix B, 1mL                                | 47728-U  |   | Kuderna-Danish macro concentrator, with ground joints, 500mL         | 64685-U  |
|   | EPA 525 Update Phthalate Esters Mix, 1mL                               | 47973    | <b>Calibration Standard<sup>▲</sup></b>   |  |          |
|   | Volatile Organic Compounds Mix 9, 1mL                                  | 47399    |   | TCL Polynuclear Aromatic Hydrocarbons Mix, 1mL                       | 49156    |
|   | EPA Phase V 525.1 MCL Pesticides Mix, 1mL                              | 47400    | <b>551 Chlorinated Disinfection Byproducts &amp; Chlorinated Solvents</b>                   |  |          |
|   | 525 Polynuclear Aromatic Hydrocarbons Mix A, 1mL                       | 48953    | <b>Columns</b>  |  |          |
|   | EPA 525 Polynuclear Aromatic Hydrocarbons Mix A, 1mL                   | 48249    |   | SPB-1 capillary column, 30m x 0.32mm ID fused silica, 1.0µm film     | 24045-U  |
|   | EPA 525/525.1 PCB Mix, 1mL   | 48246    |   | SP-2401 capillary column, 30m x 0.32mm ID fused silica, 0.5µm film   | custom   |
|   | Toxaphene, 500µg/mL in methanol, 1mL                                   | 48243    | <b>Sample Handling</b>  |  |          |
| <b>Internal Standards<sup>▲</sup></b>                         |  |          |   | Pre-assembled vials, 40mL, pk. of 100                                | 27181    |
|   | EPA 525/525.1 Internal Standard Mix, 1mL                               | 48242    | <b>Calibration Standards<sup>▲</sup></b>  |  |          |
| <b>Surrogate Standard</b>                                     |  |          |   | EPA 551 Disinfection By-Products Kit                                 | 48112    |
|   | Perylene-d12, 2000µg/mL in methylene chloride, 1mL                     | 48081    |   | EPA 551A Halogenated Volatiles Mix, 1mL                              | 48045    |
| <b>Fortification Standards<sup>▲</sup></b>                    |  |          |   | EPA 551B Halogenated Volatiles Mix, 1mL                              | 48046    |
|   | EPA 525 Fortification Solution A, 1mL                                  | 48230    |   | Chloral hydrate, 1000µg/mL in acetonitrile, 1mL                      | 47335    |
|   | EPA 525 Fortification Solution B, 1mL                                  | 48099    | <b>552.1, 552.2 Haloacetic Acids &amp; Dalapon</b>  |  |          |
| <b>QC Standard<sup>▲</sup></b>                                |  |          | <b>Columns</b>  |  |          |
|   | EPA Pesticide-Herbicide QC Mix, 5mL                                    | 49145    |   | SPB-1701 capillary column, 30m x 0.32mm ID fused silica, 0.25µm film | 24184    |
| <b>531.1 N-Methylcarbamoyloximes &amp; N-Methylcarbamates</b> |  |          |   | SPB-210 capillary column, 30m x 0.32mm ID fused silica, 0.50µm film  | 24329    |
| <b>Column</b>   |  |          | <b>Sample Handling</b>  |  |          |
|   | SUPELCO SIL LC-18 HPLC column, 15cm x 4.6mm ID, 5µm packing            | 58230    |   | ENVI-18 solid phase extraction tubes, 1mL, box of 108                | 57023    |
|   | For components of postcolumn reaction system, see our general catalog. |          | <b>Calibration Standards<sup>▲</sup></b>  |  |          |
| <b>Calibration Standards</b>                                  |  |          |   | EPA 552.1 Acids Calibration Mix ICR, 1mL                             | 47629    |
|   | custom prepared  | custom   |   | EPA 552.1 Esters Calibration Mix ICR, 1mL                            | 47630    |
| <b>547 Glyphosate</b>   |  |          |   | EPA 552.1 Acids Calibration Mix with Surrogate, 1mL                  | 47652    |
|   |  |          |   | EPA 552.1 Esters Calibration Mix with Surrogate, 1mL                 | 47653    |
|   | For components of postcolumn reaction system, see our general catalog. |          | <b>Internal Standard</b>  |  |          |
| <b>Calibration Standards</b>                                  |  |          |   | 1,2,3-Trichloropropane, 1000µg/mL in methyl tert-butyl ether, 1mL    | 47669    |
|   | custom prepared  | custom   | <b>Surrogate Standards</b>  |  |          |
| <b>548.1 Endothal</b>   |  |          |   | 2,3-Dibromopropionic acid, 1000µg/mL in methyl tert-butyl ether, 1mL | 47789    |
| <b>Columns</b>  |  |          |   | Methyl-2-bromopropionate, 1000µg/mL in methyl tert-butyl ether, 1mL  | 47668    |
|   | PTE-5 capillary column, 30m x 0.25mm ID fused silica, 0.25µm film      | 24135-U  | <b>555 Chlorinated Acids</b>  |  |          |
|   | VOCOL capillary column, 30m x 0.53mm ID fused silica, 3µm film         | 25320-U  | <b>Column</b>   |  |          |
| <b>Calibration Standards</b>                                  |  |          |   | SUPELCO SIL LC-18 HPLC column, 25cm x 4.6mm ID, 5µm packing          | 58298    |
|   | custom prepared  | custom   | <b>Calibration Standards</b>  |  |          |
| <b>549.1 Diquat &amp; Paraquat</b>                            |  |          |   | custom prepared  | custom   |
| <b>Sample Handling</b>  |  |          | *For Tekmar LSC purge/trap units. For traps for other models, refer to the Supelco catalog. |  |          |
|   | ENVI-8 solid phase extraction tubes, 6mL (0.5g packing), box of 30     | 57232    | ▲For a listing of the components of mixes and kits, refer to the Supelco catalog.           |  |          |
|   | ENVI-8 DSK extraction disks, 47mm, pk. of 24                           | 57172    | *Separate source standard is available for this product.                                    |  |          |
| <b>Calibration Standards</b>                                  |  |          |   |  |          |
|   | custom prepared  | custom   |   |  |          |

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