



## Catalog Number Guide

### Content of a catalog Number

Internal Diameter Film Thickness  
**2032-3002**  
 Type of the Phase Length

### Example

Column Description	AB-Inowax 30m x 0.32mm x 0.25um	AB-5MS 30m x 0.25mm x 0.25um
Type of Phase	20	15
Internal Diameter(mm)	0.32	0.25
Length(m)	30	30
Film Thickness(um)	0.25	0.25
Catalog No	2032-3002	1525-3002

Type of Phase	Catalog Code
AB-1	01
AB-1MS	11
AB-5	05
AB-5MS	15
AB-35	35
AB-1310	60
AB-1701	61
AB-624	62
AB-225	25
AB-Inowax	20
AB-FFAP	21
AB-CarboWax 20M	22
AB-Plot AL203, "KCL"	81
AB-Plot AL203, "S"	82
AB-Plot AL203, "M"	83
AB-Plot Molesieve	84
AB-Plot Q	86
AB-Plot U	87
Undeactivated Tubing	90
Deactivated Tubing	91
Customized column	99

### AB-PONA

P/N	Description
9002-PONA	AB-PONA 50mX0.2mmX0.5um
9006-PONA	AB-PONA 100mX0.25mmX0.5um

Length (M)	Catalog Code
15	15
25	25
30	30
50	50
60	60

Internal Diameter(mm)	Catalog Code
0.2	20
0.25	25
0.32	32
0.53	53

Film Thickness(um)	Catalog Code(WCOT)
0.1, 0.11, 0.17	01
0.25	02
0.3, 0.33	03
0.5, 0.52	05
0.88	08
1	10
1.5	15
2.65	26
5	50

Film Thickness(um)	Catalog Code(PLOT Columns)
3	03
5	05
10	10
25	25
50	50

## Abel Bonded Column Offers

AB Phase	Composition	Polarity	Approximate temperature limits°C	Similar Phases to Replace
AB-1, AB-1MS	100% Dimethylpolysiloxane	non-polar	-60 to 325/350	DB-1, HP-1, DB-1MS, HP-1MS, Ultra-1, Rtx-1, ZB-1, BP-1, SPB-1, CP-Sil 5CB
AB-5, AB-5MS	5% Diphenyl 95% Dimethylpolysiloxane	non-polar	-60 to 325/350	DB-5, HP-5, DB-5MS, HP-5MS, Ultra-2, Rtx-5, ZB-5, BP-5, SPB-5, CP-Sil 8CB
AB-1301	6% Cyanopropyl-phenyl 94% Dimethylpolysiloxane	mid-polar	-20 to 280/300	HP-1301, DB-1301, ZB-1301, BP-10, Rtx-1301
AB-225	50% cyanopropylphenyl dimethylpolysiloxane	mid-polar	40 to 220/240	DB-225, SP-2330, CP-Sil 43 CB, Rtx-225, BP-225, OV-225, 007-225, AT-225
AB-35	35% Phenyl backbone 65% Dimethylpolysiloxane	mid-polar	40 to 300/320	HP-35MS, DB-35MS, ZB-35, BPX-35, AT-35, Rtx-35, SPB-35
AB-1701	14% Cyanopropyl-phenyl 86% Dimethylpolysiloxane	mid-polar	-20 to 280/300	DB-1701, ZB-1701, BP-10, Rtx-1701, CP-Sil 19CB
AB-624	6% Cyanopropyl-phenyl 94% Dimethylpolysiloxane	mid-polar	-20 to 280/300	DB-624, ZB-624, AT-624, Rtx-624, CP-624
AB-InoWax	Polyethylene glycol	polar	40 to 260/280	HP-INNOWax, DB-WAX, DB-WAXetr, Supelco WAX10, CB-WAX, AT-Wax, HP-20M
AB-Carbowax 20M	Polyethylene glycol	polar	60 to 220	HP-20M, DB-CAM
AB-FFAP	Polyethylene glycol, acid modified	polar	40 to 260	HP-FFAP, DB-FFAP, CP-WAX58(FFAP)CB, BP-21, AT-100
AB-PLOT Molesieves	Molecular sieves, zeolite, 5A	n/a	-80 to 300	HP-PLOT Molesieve, CP-PLOT MolSieve
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "KCl"	KCl modified Alumina		-80 to 200	HP-PLOT Al <sub>2</sub> O <sub>3</sub> /KCl, GS-Alumina/KCL, CP-AL <sub>2</sub> O <sub>3</sub> /KCL PLOT
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "S"	Na <sub>2</sub> SO <sub>4</sub> modified Alumina		-80 to 200	HP-PLOT Al <sub>2</sub> O <sub>3</sub> /"S", GS-Alumina, CP-AL <sub>2</sub> O <sub>3</sub> /NA <sub>2</sub> SO <sub>4</sub> PLOT, RT-Alumina
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M"	Na <sub>2</sub> MoO <sub>4</sub> modified Alumina		-80 to 200	HP-PLOT Al <sub>2</sub> O <sub>3</sub> /"M", GS-Alumina
AB-PLOT Q	Divinylbenzen polymer	non-polar	-80 to 280/300	HP-PLOT Q, GS-Q, CP-PoraPLOT Q HT, Rt-Q
AB-PLOT U	Divinylbenzen ethylene glycol dimethacrylate copolymer	polar	-80 to 190/200	HP-PLOT U, CP-PoraPLOT U

## Method/Column Selection Guides

### ■ GC Columns stationary phase applications guide

AB Phase	Composition	Polarity	Approximate temperature limits°C	General separations
AB-1, AB-1MS	100% Dimethylpolysiloxane	non-polar	-60 to 325/350	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfurs, flavors and fragrances
AB-5, AB-5MS	5% diphenyl 95% Dimethylpolysiloxane	non-polar	-60 to 325/350	Semivolatiles, alkaloids, drugs, FAMES, Halogenated compounds, pesticides, herbicides
AB-1301	6% cyanopropyl-phenyl 94% Dimethylpolysiloxane	mid-polar	-20 to 280/300	Aroclors, alcohols, pesticides, VOCs
AB-35	35% phenyl backbone 65% Dimethylpolysiloxane	mid-polar	40 to 320/340	Pesticides, aroclors, drugs of abuse, pharmaceutical molecules
AB-1701	14% cyanopropyl-phenyl 86% Dimethylpolysiloxane	mid-polar	-20 to 280/300	Aroclors, pesticides, herbicides, TMS sugars
AB-624	6% cyanopropyl-phenyl 94% Dimethylpolysiloxane	mid-polar	-20 to 280/300	Volatiles in environmental samples
AB-InoWax	Polyethylene glycol	polar	40 to 260/280	Alcohols, solvents, essential oils, flavors and fragrances
AB-CarboWAX 20M	Polyethylene glycol	polar	40 to 220/240	Alcohols, free acids, ether, glycol, solvents
AB-FFAP	Polyethylene glycol, acid modified	polar	40 to 240	Alcohols, organic acids, aldehydes, ketones, acrylates
AB-PLO Molesieves	Molecular sieves, zeolite, 5A	n/a	-80 to 300	Fixed gases, noble gases, argon/oxygen
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "KCl"	KCl modified Alumina	least selective	-80 to 200	Hydrocarbons, C1 to C6, extend to C10s, halocarbons
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "S"	Na <sub>2</sub> SO <sub>4</sub> modified Alumina	moderate selective	-80 to 200	Hydrocarbons, C1 to C6, extend to C10s, halocarbons
AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M"	Na <sub>2</sub> MoO <sub>4</sub> modified Alumina	most selective	-80 to 200	Hydrocarbons, C1 to C6, extend to C10s, halocarbons
AB-PLOT "Q"	Divinylbenzen polymer	non-polar	-80 to 280/300	Hydrocarbons, C1 to C10, from air/CO, CO <sub>2</sub> , water, sulfurs, amines, acids, oxygenated solvents, halocarbons
AB-PLOT "U"	Divinylbenzen ethylene glycol dimethacrylate copolymer	polar	-80 to 190/200	Hydrocarbons, C1 to C8 from air/CO, water, CO <sub>2</sub> , sulfurs, amines, acids, oxygenated

## USP GC Phases

■ United States Pharmacopoeia (USP GC Phases)

USP	Composition	Equivalent or approximate AB Phase
G1	Dimethylpolysiloxane, oil	AB-1, AB-1MS
G2	Dimethylpolysiloxane gum	AB-1, AB-1MS
G14	Polyethylene glycol, average MW 950--1,050	AB-InoWax
G15	Polyethylene glycol, average MW 3,000--3,700	AB-InoWax, AB-CarboWax20M
G16	Polyethylene glycol, average MW 15,000	AB-InoWax, AB-CarboWax20M
G20	Polyethylene glycol, average MW 380-420	AB-InoWax
G25	Polyethylene glycol, TPA (Carbowax 20M, Terephthalic acid)	AB-FFAP
G27	5% phenyl 95% methylpolysiloxane	AB-5, AB-5MS
G28	25% phenyl 75% methylpolysiloxane	AB-35
G32	20% phenylmethyl 80% Dimethylpolysiloxane	AB-35
G35	Polyethylene glycol & diepoxide esterified with nitroterephthalic acid	AB-FFAP
G36	1% vinyl 5% phenylmethylpolysiloxane	AB-5, AB-5MS
G38	Phase G1 plus tailing inhibitor	AB-1, AB-1MS
G39	Polyethylene glycol average MW 1500	AB-InoWax
G41	Phenylmethyldimethylsilicone (10% phenyl substituted)	AB-5MS
G42	35% diphenyl 65% Dimethylvinylsiloxane	AB-35
G43	6% Cyanopropylphenyl-94% dimethylpolysiloxane	AB-624, AB-1301
G45	Divinylbenzene ethylene glycol dimethacrylate	AB-PLOT U
G46	14% Cyanopropylphenyl-86% methylpolysiloxane	AB-1701

## Method and recommendations

### ■ Environmental/EPA Methods

Analyte Type	EPA Method Reference	Common Sample Preparation	Detector Types	Sample Matrix	Abel Recommendations (Part No.)
<b>Volatiles</b>					
Trihalomethanes	501	Purge and trap,direct injection,headspace	ELCD,ECD	Drinking water	AB-624,30m x0.53mm x 3um(6253-3030)
Volatile Organic Compounds(VOCs)	502.2,8021 CLP-Volatiles	Purge and trap,direct injection,headspace	PID,ELCD	Drinking water Waste water Solid wastes	AB-624, 75m x 0.53mm x 3um (6253-7530)
Purgeable Halogenated Organics	601 8010	Purge and trap headspace for screening	PID,ELCD	Waste water Solid wastes	AB-624, 75m x 0.53mm x 3um (6253-7530)
Purgeable Aromatic Organics	503 .1 ,602 8020	Purge and headspace for screening	PID,	Drinking water Trap,waste water Solid wastes	AB-624,30m x0.53mm x 3um(6253-3030)
Volatile Organic Compounds(VOCs) Using MSD	524.2, 624 82,408,260 CLP-VOCs	Purge and trap,direct injection,headspace	MSD	Drinking water waste water Solid wastes	AB-624, 60m x 0.32mm x 1.8um (6232-6018)
Volatile Organic Compounds(VOCs) Using 5973 MSD	524.2, 624 82,408,260 CLP-VOCs	Purge and trap,direct injection,headspace	MSD (5973)	Drinking water Waste water Solid wastes	AB-624, 25m x 0.20mm x 1.12um (6220-2510)
EDB and DBCP	504.1,8011	Microextraction with Hexane	ECD	Drinking water Solid wastes	AB-624,30m x0.53mm x 3um(6253-3030) AB-624,30m x0.53mm x 3um(6253-3030)
Acrylonitrile and Acrolein	603, 8015 8031	Purge and trap,liquid extraction,sonication	FID,NPD	Waste water Solid wastes	
<b>Semivolatiles</b>					
Semivolatile Organic Compounds	525 ,625 8270	Liquid extraction sonication,soxhlet extraction,SPE	MSD	Drinking water Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.5um (1525-3005)
Phenols	528 ,604 8040 ,8041	Liquid extraction sonication,soxhlet extraction derivatization	ECD,FID	Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5, 30m x 0.53mm x 1.5um (0553-3015)
Phthalate Esters	506 ,606 8060, 8061	Liquid extraction sonication,soxhlet extraction,SPE	ECD,FID	Drinking water Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5, 30m x 0.53mm x 1.5um (0553-3015)
Benzidines	605	Liquid extraction	ECD	Waste water	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5, 30m x 0.53mm x 1.5um (0553-3015)
Nitrosamines	607 ,8070	Liquid extraction sonication,soxhlet extraction,SPE	NPD	Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5, 30m x 0.53mm x 1.5um (0553-3015)
Nitroaromatics and Isophorone	609, 8090	Liquid extraction sonication,soxhlet extraction,SPE	ECD,FID	Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5, 30m x 0.53mm x 1.5um (0553-3015)
Polynuclear Aromatic Hydrocarbons(PAHs)	610 ,8100	Liquid extraction sonication,soxhlet extraction,SPE	FID	Waste water Solid wastes	AB-5MS,30m x 0.25mm x0.25um (1525-3002) AB-5MS,30m x 0.32mm x0.25um (1532-3002) AB-1MS, 30m x 0.25mm x 0.25um(1125-3002)
Chlorinated Hydrocarbons	612 8120 8121	Liquid extraction sonication,soxhlet extraction,SPE	ECD	Waste water Solid wastes	AB-5MS,30m x 0.32mm x 0.5um(1532-3005) AB-1MS, 30m x 0.32mm x 0.5um(1132-3005)
Chlorinated Disinfection Byproducts	551 .551. 1A	Liquid extraction derivatization	ECD	Drinking water	AB-5MS, 30m x 0.25mm x 1.0um(1525-3010) AB-1MS, 30m x 0.25mm x 1.0um(1125-3010)
Halogenated Acetic Acids	552 ,552.1 552.2	Liquid extraction derivatization	ECD	Drinking water	AB-35MS, 30m x 0.32mm x 0.25um (3532-3002)
<b>Pesticides,Herbicides and PCBs</b>					
Organochlorine Pesticides and PCBs	508.0, 608 8081A,8082 CLP-Pesticides	Liquid extraction sonication,soxhlet extraction,SPE	ECD	Drinking water Waste water Solid wastes	AB-35, 30m x 0.32mm x 0.25um (3532-3002)
Phenoxy Acid Herbicides	515,615 8150 ,8151	Liquid extraction sonication,soxhlet extraction,SPE	ECD	Drinking water Waste water Solid wastes	AB-35, 30m x 0.32mm x 0.25um (3532-3002)
N-and P-Containing Pesticides and Herbicides	507 ,614 619 ,622 8140 ,8141A	Liquid extraction sonication,soxhlet extraction,SPE	NPD,ELCD FPD	Drinking water Waste water Solid wastes	AB-35, 30m x 0.25mm x 0.25um (3525-3002) AB-5, 30m x 0.25mm x 0.25um(1525-3002)

**■ ASTM Methods**

<b>Method Designation</b>	<b>Method Title</b>	<b>Abel recommended columns</b>	<b>Part No</b>
D 1945	Standard test method for the analysis of natural gas by GC	AB-PLOT Molesieve 15mx0.53mm id, 50um film AB-PLOT Q, 15mx0.53mm id, 30um film	8453-1550 8653-1530
D 1946	Standard test method for the analysis of reformed gas by GC	AB-PLOT Molesieve 15mx0.53mm id, 50um film AB-PLOT Q, 15mx0.53mm id, 30um film	8453-1550 8653-1530
D 1983	Standard test method for the analysis of fatty acid compositions by GLC of methyl ester	AB InoWax, 30mx0.25mm id, 0.25um film	2025-3002
D 2163	Standard test method for the analysis of liquified petroleum gases and propene concentration by GC	AB-PLOT Al <sub>2</sub> O <sub>3</sub> "KCl" 30mx0.53mm id, AB-PLOT Al <sub>2</sub> O <sub>3</sub> "S" 30mx0.53mm id,	8153-3015 8253-3015
D 2268	Standard test method for the analysis of high purity n-Heptane and isoOctane by capillary GC	AB-1, 60mx0.25mm id, 0.50um film	0125-6002
D 2306	Standard test method for C8 aromatic hydrocarbons by GC	AB-InoWax, 60mx0.25mm id, 0.25um film	2025-6002
D 2426	Standard test method for Butadiene dimer, styrene in butadiene concentration by GC	AB-1, 30mx0.53mm id, 5um film	0153-3050
D 2427	Standard test method for determination of C2 through C5 hydrocarbons in gasoline by GC	AB-1, 30mx0.53mm id, 5um film AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M", 30mx0.53mm id,	0153-3050 8353-3015
D2504	Standard Test Method for Noncondensable Gases in C2 and Lighter Hydrocarbon Products by GC	AB-PLOT Molesieve, 30m x 0.53mm id, 50um film	8453-3050
D2593	Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by GC	AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M", 30mx0.53mm id,	8353-3015
D2712	Standard Test Method for Hydrocarbon Traces in Propylene Concentrates by GC	AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M", 50mx0.53mm id,	8353-5015
D2804	Standard Test Method for Purity of Methyl Ethyl Ketone by GC	AB-InoWax, 30m x0.53mm id, 1.0um film	2053-3010
Extended D 2887	Standard Test Method for Boiling Range Distribution of Petroleum fractions by GC, to C60	AB-1, 10m x 0.53mm id, 0.88um film AB-1, 5m x 0.53mm id, 0.88um film	0153-1008 0153-0508
D3054	Standard Test Method for Analysis of Cyclohexane by GC	AB-1, 60m x0.32mm id, 0.50um film	0132-6005
D3257	Standard Test Method for Aromatics in Mineral Spirits by GC	AB-624, 30m x 0.53mm id ,3.0um film	6253-3030
D3329	Standard Test Method for Purity of Methyl isobutyl Ketone by GC	AB-InoWax, 30m x0.53mm id, 1.0um film AB-624, 30m x 0.53mm id ,3.0um film	2053-3010 6253-3030
D3432	Standard Test Method for Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by GC	AB-1MS ,30m x 0.32mm id, 1.00um film	1132-3010
D3447	Standard Test Method for Purity of Halogenated Organic Solvents	AB-624, 30m x 0.53mm id ,3.0um film	6253-3030
D3534	Standard Test Method for PCBs in Water	AB-1MS ,30m x 0.32mm id, 1.00um film	1132-3010
D3545	Standard Test Method for Alcohol Content and Purity of Acetate Esters by GC	AB-624, 30m x 0.53mm id ,3.0um film	6253-3030
D3687	Standard Practice for Analyses of Organic Vapors Collected by the Activated Charcoal Tube Adsorption Method	AB-InoWax, 30m x0.53mm id, 1.0um film	2053-3010
D3695	Standard Test Method for Volatile Alcohols in Water by Direct Aqueous injection GC	AB-InoWax, 30m x0.53mm id, 1.0um film	2053-3010
D3760	Standard Test Method for Analysis of Isopropylbenzene(Cumene)by GC	AB-InoWax, 60m x 0.32mm id, 0.25um film(Column A) AB-1, 50m x 0.32mm id, 0.52um film(ColumnB)	2032-6002 0132-5005
D3797	Standard Test Method for Analysis of O-Xylene by GC	AB-InoWax, 60m x 0.32mm id, 0.50um film	2032-6005
D3798	Standard Test Method for Analysis of P-Xylene by GC	AB-InoWax, 60m x 0.32mm id, 0.50um film	2032-6005

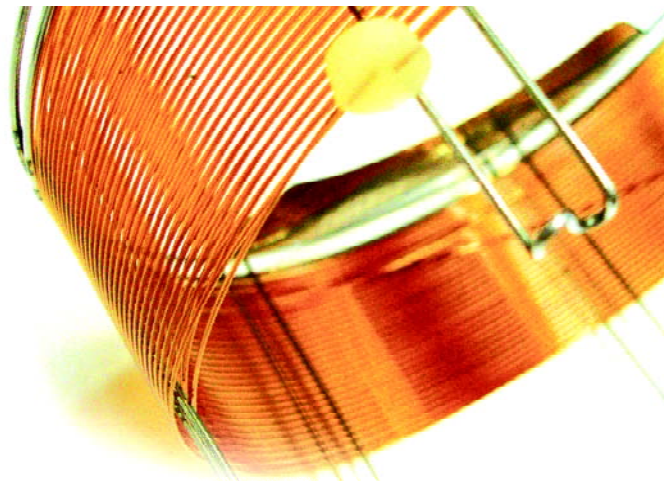
Method Designation	Method Title	Abel recommended columns	Part No
D3893	Standard Test Method for Purity of Methyl Amyl Ketone and Methyl Isoamyl Ketone by GC	AB-624, 30m x 0.53mm id ,3.0um film	6253-3030
D3973	Standard Test Method for Low-Molecular Weight Halogenated Hydrocarbons in Water	AB-1, 30m x 0.53mm id, 2.65um film	0153-3026
D4415	Standard Test Method for Determination of Dimer in Acrylic Acid	AB-FFAP,30m x 0.32mm id,0.25um film	2132-3002
D4424	Standard Test Method for Butylene Analyses by GC	AB-PLOT Al <sub>2</sub> O <sub>3</sub> "S",50m x 0.53mm id	8253-5015
D4443	Standard Test Method for Residual Vinyl Chloride Monomer Content in PPB Range in Vinyl Chloride Homo-and Co -Polymers by Headspace GC	AB-1, 30m x 0.53mm id, 2.65um film	0153-3026
D4864	Standard Test Method for Determination of Traces of Methanol in Propylene Concentrates by GC	AB-InoWax, 30m x0.53mm id, 1.0um film AB-PLOT Q, 30m x0.53mm id, 30um film	2053-3010 8653-3030
D4947	Standard Test Method for Chordane and Heptachlor Residues in Indoor Air	AB-5,30m x 0.53mm id,1.5um film	0553-3015
D4961	Standard Test Method for GC Analysis of Major Organic Impurities in Phenol Produced by the Cumene Process	AB-PLOT Q, 15m x 0.53mm id,(Method B)	8653-1530
D4983	Standard Test Method for Cyclohexylamine,Morpholine and Diethylaminoethanol in Water and Condensed Steam by Direct Aqueous Injection GC	AB-5MS 30m x 0.32mm id,1.00um film	1532-3010
D5008	Standard Test Method for Ethyl Methyl Pentonal Content and Purity Value of 2-Ethylhexanol by GC	AB-1 ,15m x0.53mm,id, 5.0um film AB-INOWax,30m x 0.32mm id,0.25um film	0153-1550 2032-3002
D5060	Standard Test Method for Determining Impurities in High-Purity Ethylbenzene by GC	AB-INOWax,60m x 0.32mm id,0.5um film	2032-6005
D5075	Standard Test Method for Nicotine in Indoor Air	AB-5,30m x 0.53mm id,1.5um film AB-5,30m x 0.32mm id,1.0um film	0553-3015 0532-3010
D5135	Standard Test Method for Analysis of Stryrene by Capillary GC	AB-INOWax,60m x 0.32mm id,0.5um film	2032-6005
D5307	Standard Test Method Determination of Boiling Range Distribution of Crude Petroleum by GC	AB-1,7.5m x 0.53mm id ,5.0um film	0153-0750
D5310	Standard Test Method for Tar Acid Composition by Capillary GC	AB-5MS 30m x 0.25mm id,0.25um film	1525-3002
D5316	Standard Test Method for 1, 2-Dibromoethane and 1,2-Dibromo-3-Chloropropane in Water by Microextraction and GC	AB-1MS ,30m x 0.32mm id,1.00um film(Column B) AB-PLOT Q 30m x 0.53mm id ,30um	1132-3010 8653-3030
D5317	Standard Test Method for Determination of Chlorinated Organic Acid Compounds in Water by GC with Electron Capture Detector	AB-5MS 30m x 0.25mm id,0.25um film(Column 1) AB-1701, 30m x0.25mm id, 0.25um film (Column 2) AB-35 ,30m x 0.25mm id,0.25um film	1525-3002 6125-3002 3525-3002
D5320	Standard Test Method Determination of 1,1-Trochloroethane and Methylene Chloride in Stabilized Trichloroethylene and Tetrachloroethylene	AB-1 30m x 0.53mm id,3.0um film AB-624, 30m x0.32mm id, 1.8um film	0153-3030 6232-3018
D5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether(MTBE)by GC	AB-PLOT Q, 30m x0.53mm id	8653-3030
D5442	Standard Test Method for Analysis of Petroleum Waxes by GC	AB-5, 15m x 0.25mm id 0.25um film	0525-1502
D5475	Standard Test Method for Nitrogen and Phosphorus-Containing Pesticides in Water by GC With a Nitrogen Phosphorus Detector	AB-5MS,30m x 0.25 id,0.25um film AB-35 ,30m x 0.25mm id,0.25um film AB-1701, 30m x0.25mm id, 0.25um film	1525-3002 3525-3002 6125-3002
D5501	Standard Test Method Determination of Ethanol Content of Denatured Fuel Ethanol by GC	AB-1,100m x 0.25mm id ,0.50um film	0125-1005



Method Designation	Method Title	Abel recommended columns	Part No
D5507	Standard Test Method Determination of Trace Organic Impurities in Monomer Grade Vinyl chloride by Capillary	AB-PLOT Q, 15m x 0.53mm id AB-PLOT U, 30m x 0.53mm id	8653-1530 8753-3020
D5508	Column/Multi-dimensional GC Standard Test Method Determination of Residual Acrylonitrile Monomer in Styrene-Acrylonitrile Co-polymer Resins and Nitrile-Butadiene Rubber by	AB-PLOT Q, 30m x 0.53mm id	8653-3030
D5580	Headspace-Capillary GC Standard Test Method Determination of Benzene, Toluene, Ethylbenzene, P/m-Xylene, C9 and Heavier Aromatics, and Total Aromatics in Finished	AB-1, 30m x 0.53 mm id, 5.0um film	0153-3050
D5599	Gasoline by GC Standard Test Method Determination of Oxygenates in Gasoline by GC and	AB-1, 60m x 0.25mm id, 1.0um film	0125-6010
D5623	Oxygen Selective Flame Ionization Detection Standard Test Method Sulfur Compounds in Light Petroleum Liquids	AB-1, 30m x 0.32mm id, 4.0um film	0132-3040
D5739	by GC and Sulfur Selective Detection Standard Practice for Oil Spill Source Identification by GC and Positive Ion Electron Impact Low Resolution	AB-5, 30m x 0.25mm id, 0.25um film	0525-3002
D5769	Mass Spectrometry Standard Test Method Determination of Benzene, Toluene, and Total Aromatics	AB-1, 60m x 0.25mm id, 1.0um film	0125-6010
D5812	in Finished Gasoline by GC/MS Standard Test Method Determination of Organochlorine Pesticides in Water	AB-5MS, 30m x 0.25mm id, 0.25um film AB-35, 30m x 0.25mm id, 0.25um film AB-1701, 30m x 0.25mm id, 0.25um film	1525-3002 3525-3002
D5917	by Capillary Column GC Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons	AB-INOWax, 60m x 0.32mm id, 0.25um film	6125-3002 2032-6002
D5986	by GC and External Calibration Standard Test Method for Determination of Oxygenates Benzene, Toluene, C8-C12 Aromatics and Total Aromatics in Finished	AB-1, 60m x 0.53mm id, 5.0um film	0153-6050
D6144	Gasoline by GC/FTIR Standard Test Method for Trace Impurities	AB-1, 60m x 0.25mm id, 1.0um film	0125-6010
D6159	in Alpha-Methylstyrene by Capillary GC Standard Test Method for Determination Hydrocarbon Impurities in Ethylene by GC	AB-PLOT Al <sub>2</sub> O <sub>3</sub> "KCI", 50m x 0.53mm id (Column 1) AB-PLOT Al <sub>2</sub> O <sub>3</sub> "M", 50m x 0.53mm id (Column 1) AB-1, 30m x 0.53 mm id, 5.0um film (column 2) AB-5MS, 30m x 0.32mm id X 0.25um film	8153-5015 8353-5015 0153-3050 1532-3002
D6160	Standard Test Method for Determination		
D2360	of PCBs in Waste Materials by GC Standard Test Method for Trace Impurities	AB-INOWax, 60m x 0.32mm id, 0.25um film	2032-6002
E1616	in Monocyclic Aromatic Hydrocarbons by GC Standard Test Method for Analysis of Acetic	AB-1, 50m x 0.32mm id, 0.52um film	0132-5005
E1863	Anhydride Using GC Standard Test Method for Analysis of	AB-INOWax, 30m x 0.32mm id, 1.0um film AB-PLOT Q, 30m x 0.32mm id, 15um film	2032-3010
E202	Acrylonitrile by GC Standard Test Method for Analysis of	AB-624, 30m x 0.53mm id, 3.0um film	8632-3015 6253-3030
E475	Ethylene Glycols and Propylene Glycols Standard Test Method for Assay of Di-tert-Butyl Peroxide Using GC	AB-5, 30m x 0.53mm id, 5.0um film	0553-3050



## Column Care



Proper column care and use will enhance application success of GC column and prolong column lifetime. Column care includes how to install it, how to maintain it for storage, and how to regenerate its performance.

### Column installation

#### ■ Pre-installation

##### 1. Know your GC

It is never over emphasized knowing your GC and its history prior to using a GC column for success. Most problems of GC analyses are not really come from column but rather from improper instrument or instrumentation. The checklist you should know about GC is:

- GC condition: brand new or well used
- Recent change of GC location
- GC idling duration
- Recent maintenance of GC system and gas line change
- Abnormal GC column degradation
- Previous GC column performance record/logbook
- Carrier gas quality

All these offer clues about instrument system performance for new use. Particularly, if previous GC column behaved abnormally, such as shortened lifetime, high bleed, ghost peak, peaking tailing, no signal or too high baseline signal, most likely, it pinpoints leaking problem, dirty inlet, gas flow or blockage of detector jet.

##### 2. Have a good GC ready

If your GC exhibits some of above symptoms, fix instrument problems by following GC manufacturer' s recommendations. Some of the recommendations are:

- Use high purity gases including column carrier gas and makeup gas
- Setup proper gas flows for both inlet and detector
- Change seals, septum and liner
- Change column ferrules
- Change jet
- Condition GC inlet and detector at high temperature for hours

After checking out these practices, you will have a good GC ready for new instrumentation with your new GC column.

##### 3. Know your GC column

- Brand new column or used column
- Column shelf time in lab
- Any column breakage
- Copy of test chromatogram from column manufacturer
- Previous analysis chromatogram of the column to be used

It is obvious that you won' t waste your time to install a bad column.

#### ■ Installation

1. Carefully uncoil column one half coils on both ends
2. Loosely hang the column inside GC oven
3. Use known good and correct ferrules and column nuts
4. Install the column nuts and ferrules to column each end
5. Cut column each end neatly for 3—5cm with a good column cutter. Do not hand break column end tip without a cutter
6. Thoroughly examine the cut. Re-cut column if the cut is not neat
7. Attach column end to inlet. Follow instrument manufacturer' s specification on column end tip length into instrument, such as 2-3cm for split/split inlet, 1-2mm gap length from the very end of the FID jet, etc. Make sure the

- column end not touch metal wall more than 3 times, as multiple touching may damage the column tips that affect sample introduction into column
8. Finger-tighten the column nut with another hand holding column end position for proper insert length, then use proper size wrench to completely tighten the nuts. Do not over tighten the nut, as it may smash the column. Make sure column tip insert length is in the range of GC manufacturer's recommendation or specification
  9. Stepwise setup the column pressure to establish column flow or set up proper column flow
  10. Repeat connection to detector
  11. Securely hang the column inside GC oven. Do not over uncoil GC column at each end as it may become broken after thermal cycling. Coil extra loosed column into the column cage for securing
  12. Adjust column flow to manufacturer's specification. A general flow setting would be:

Column id (mm)	Column flow range (ml/min)
0.53	5 — 8
0.32	1.0 — 2.5
0.25	0.8 — 1.5
0.2	0.4 — 1.0

13. Check for any leak sign with Snoop technique or other proper leak detection technique
14. Set properly inlet and detector temperatures
15. Set oven temperature around 50 — 100 °C
16. Turn on detector after both the temperature and the flows have been established
17. Check for stabilized signal level. If signal is too low or too high, it may indicate leaking column connection or broken column at connection ends. Redo the column installation as needed
18. Condition columns at its upper limit temperature - (10 — 20 °C) for minimum 30min. Over night conditioning is preferred
19. Check for detector signal. If it is too high, there may be a leaking problem, dirty inlet/detector, or bad column. Find leaking place and redo column installation, or clean inlet/detector, or change another column
20. Adjust column flow to analysis condition if necessary

Good column installation will help obtaining good and successful analysis results.

## Column Storage

### ■ Idling inside GC oven

Maintain proper oven temperature, e.g., 100 — 150 °C under proper column carrier flow.

### ■ Out side GC oven

Septum-seal both ends of the column, store column in its original box. Avoid moisture or chemical vapor.

### ■ Causes of performance degradation

Many root causes can result in column performance degradation. Most root causes are oxygen present in carrier gas stream (oxidation), thermal damage, and sample contamination. Check for instrumentation obvious before time-consuming troubleshooting. The following table gives out a general troubleshooting process and some remedies. It is important to follow proper column installation step and maintain a good instrument to prevent from column performance degradation during run time.

Degradation Symptoms	Root cause	From	Remedy
-High column bleed- Column selectivity change/shift- Retention time shift- Chopping baseline profile- Peak tailing- Blockage of detector jet and abnormal signal level	-Oxygen in carrier gas flow path-Bad column	- Low grade carrier gas used- Leak in gas line connection- Instrument leaking places: inlet, pressure regulator, valve- Home gas plumb connection with dead/void volume in the flow path	-Change carrier gas grade-Use traps-Properly re-plumbing-Fix instrument leaks-Purge column for longer time at low temperature-Avoid high temperature chromatography-Change column
-Peak tailing- Unstable or noisy detector signal- Retention time shift	-Moisture present in gas stream line- Sample contamination- Thermal damage at temperature over column upper limit	-System off for long time-Low grade carrier gas-Large dirty sample introduction	-Use trap in carrier gas line- Bake instrument-Do not turn off instrument unless necessary- Good sample preparation-Trim contaminated column ends by 0.1 — 0.5m
-Accelerated column bleed-Significant column selectivity change-Severely peak tailing-Peak broadening	-Thermal damage	-Oven temperature exceeding the column upper temperature limit-Too high inlet/detector temperatures-Combination of oxidation, duration time and column temperature	-Almost irreversible degradation-Trim column each end by 0.5 — 1m-Reduce used temperatures-Switch high grade carrier gas
-Column breakage	-Human error-Instrumentation error-Bad column	-Bad column-Gas pressure pulse -Fast temperature ramping up/down-Column nut tightened too much	-Slowly setup carrier gas pressure with EPC-Reduce temperature ramping-Butt-connect the broken column-Redo column installation

## Column regeneration

### ■ Conditioning

Condition or bake column at isothermal temperature close to the column upper temperature limit with 2x column working carrier flow for 2 — 24hours. Avoid use programmable temperature profile to condition column. This regeneration can be effective for sample contamination. But sometimes conditioning can result in accelerated degradation if oxygen is presented in carrier stream. Column surface may become active for many polar compounds after conditioning.

### ■ Multiple solvent injections

Injecting solvent multiple times into columns at 50 — 100°C oven temperature may regenerate column performance. Avoid using oven temperature below solvent boiling point as solvent condensation will wash out too much stationary phase at the inlet end. The column surface may become less inert or more active after multiple time injections.

### ■ Trim both ends of column

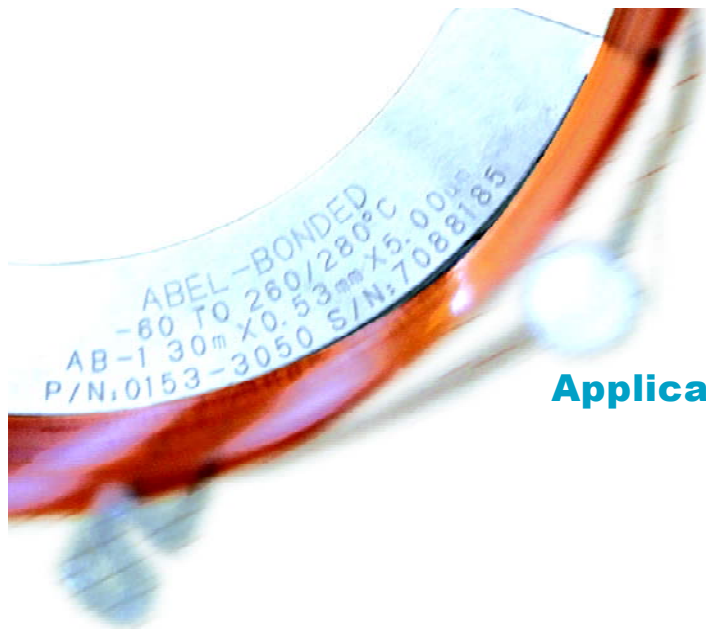
Trim both ends of column by 0.1 — 1m could be an easy and effective way to regenerate column performance. Trim longer length at detector end than at inlet end. Adjust instrument condition (e.g., column flow) accordingly to maintain retention time locking. After trimming, condition column for 30min to 2hrs.

Trim column leads to shorter column length, and eventually, make it unusable.

#### ■ Solvent rinse

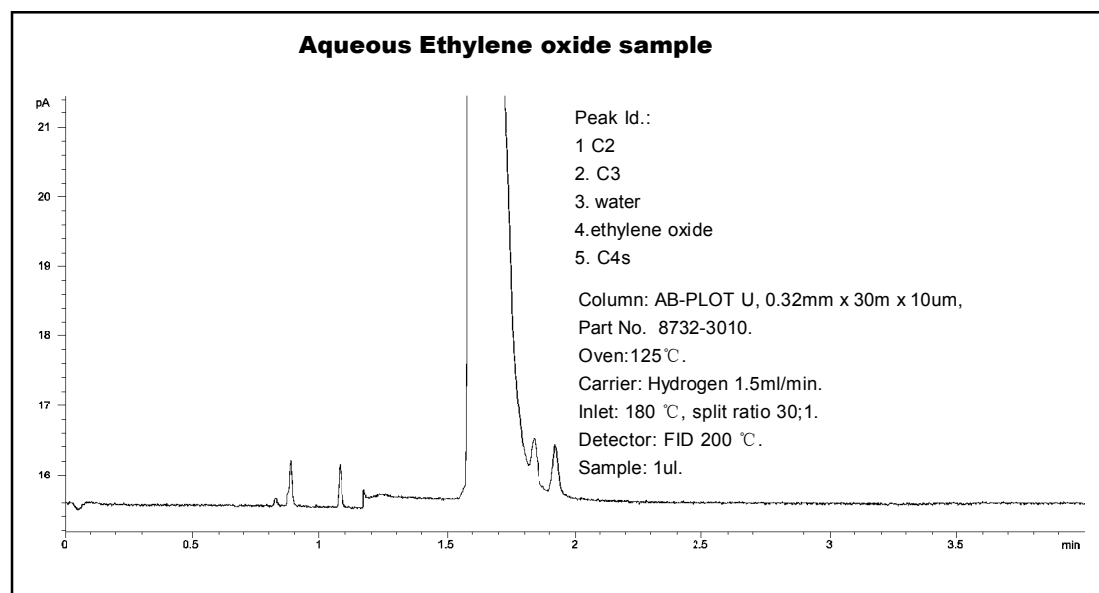
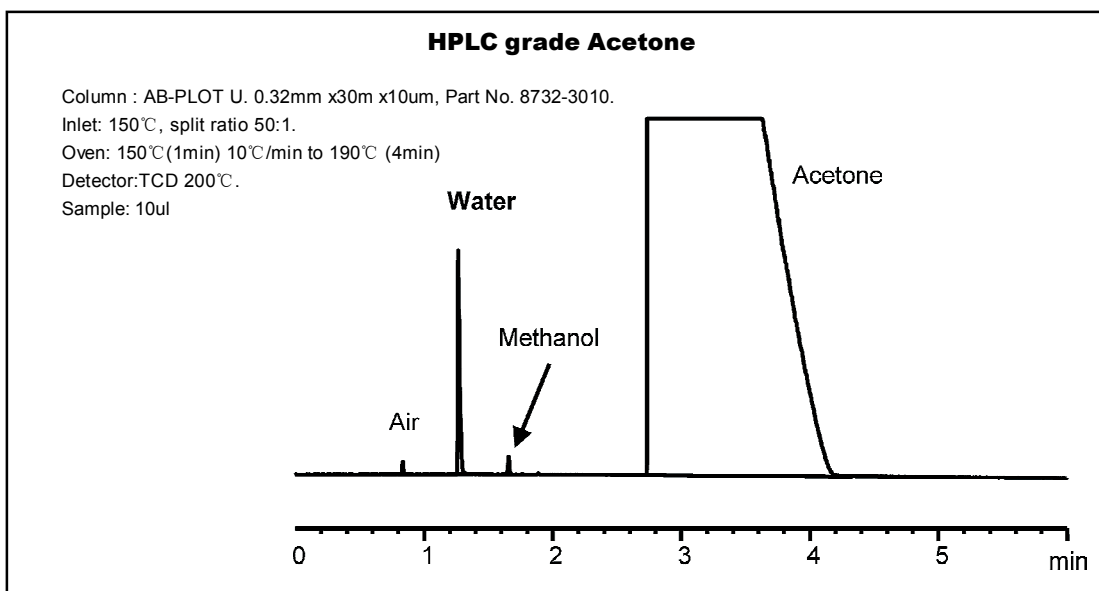
Offline solvent rinse is an old fashion to regenerate column performance. As column becomes commodity product now days, we do not recommend this technique. Instead, we recommend solvent injection as an alternate.

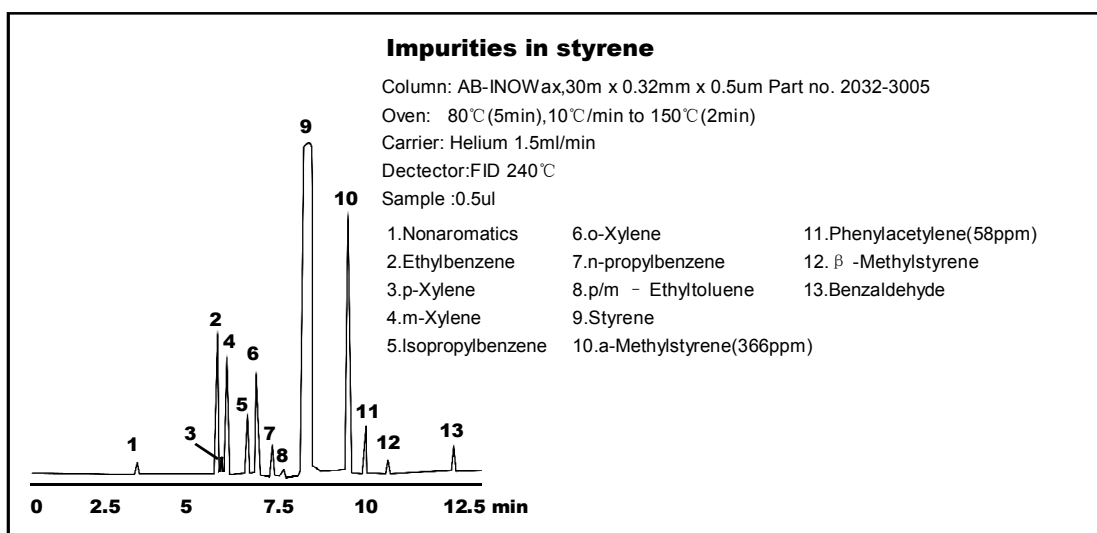
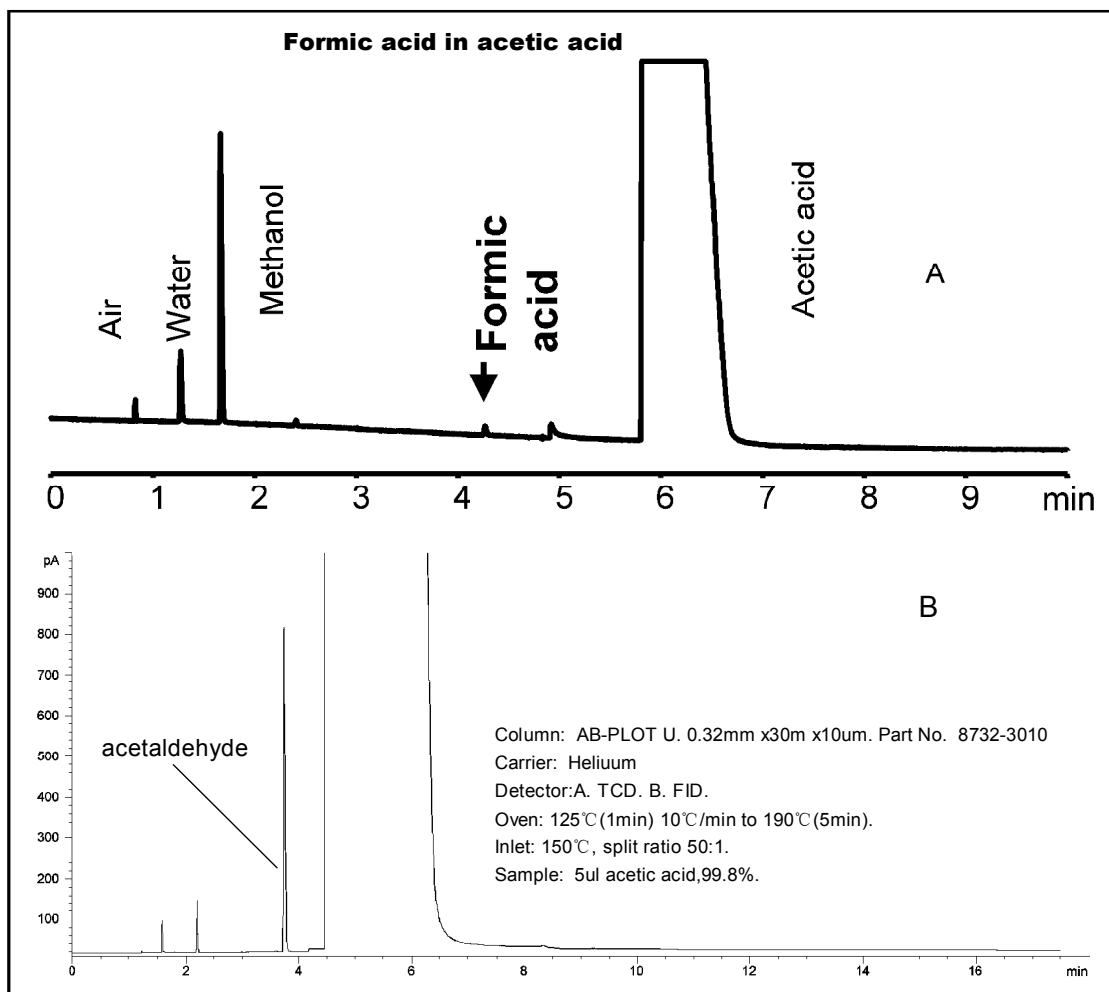
In extreme case of offline solvent rinse needed, use high grade (HPLC or GC grade) solvent compatible to stationary phase, such as non-aqueous solvent for wax column, hexane/toluene for polysiloxane column. Column should only be rinsed with 2 — 3 column volume solvent at low pressure. Avoid rapidly pressure change that often causes column breakage. Gas purge dry column for 30min to one hour, and properly condition the column at its upper temperature limit for 2 — 10hours.

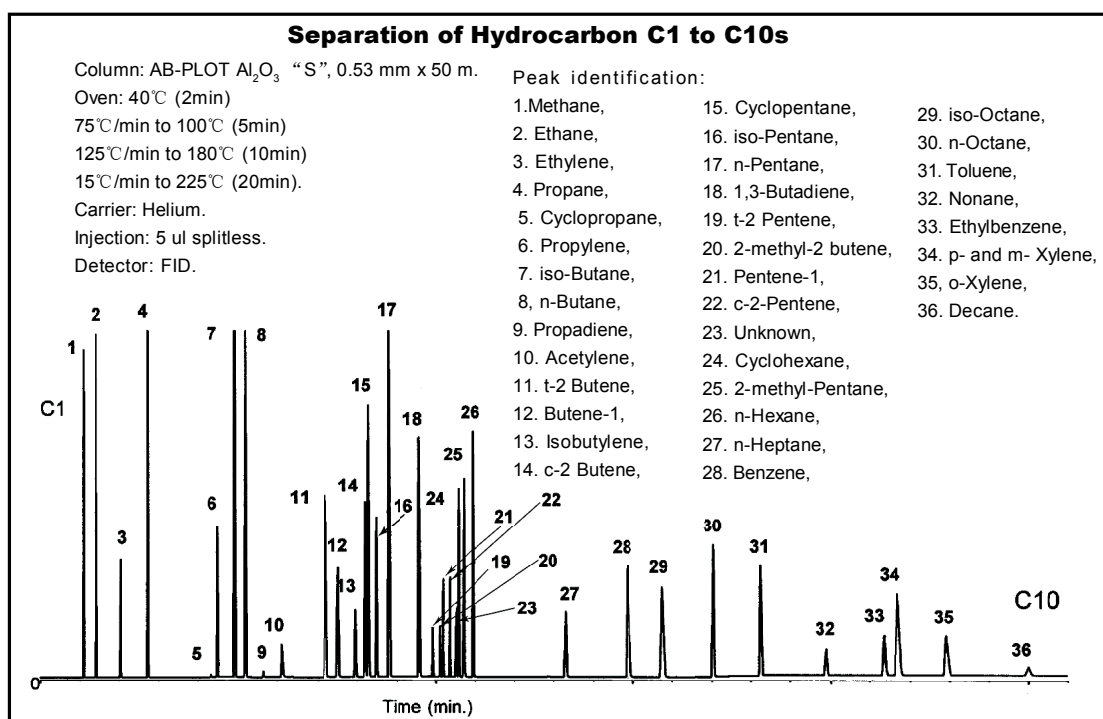
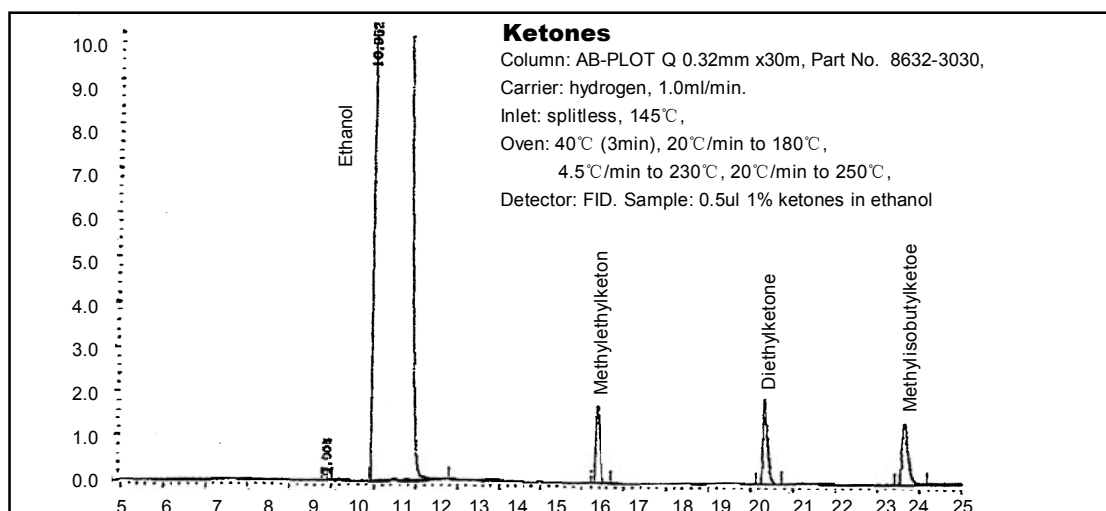


## Applications

### Chemicals

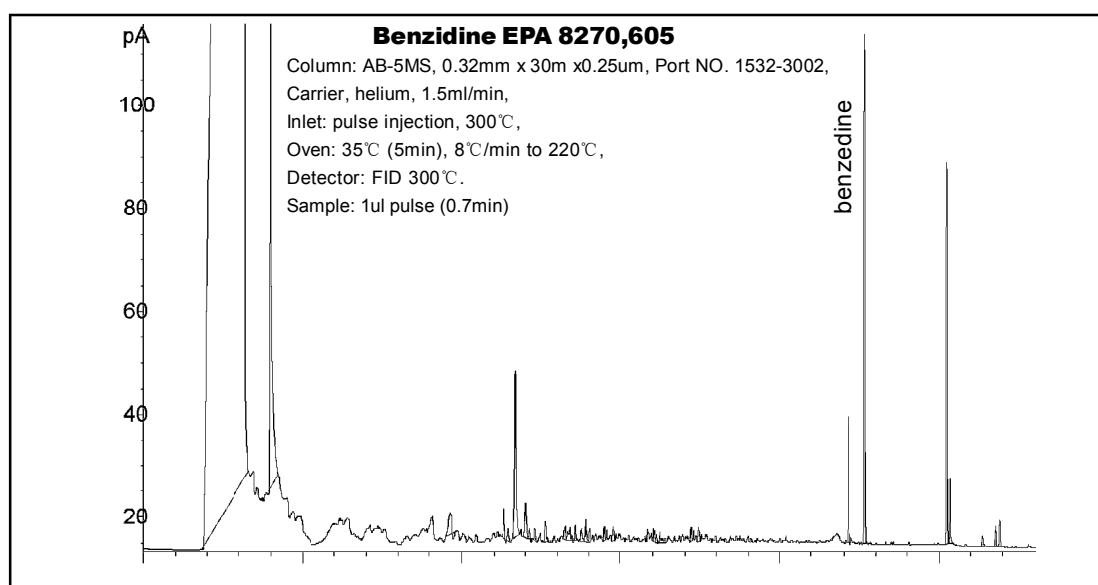
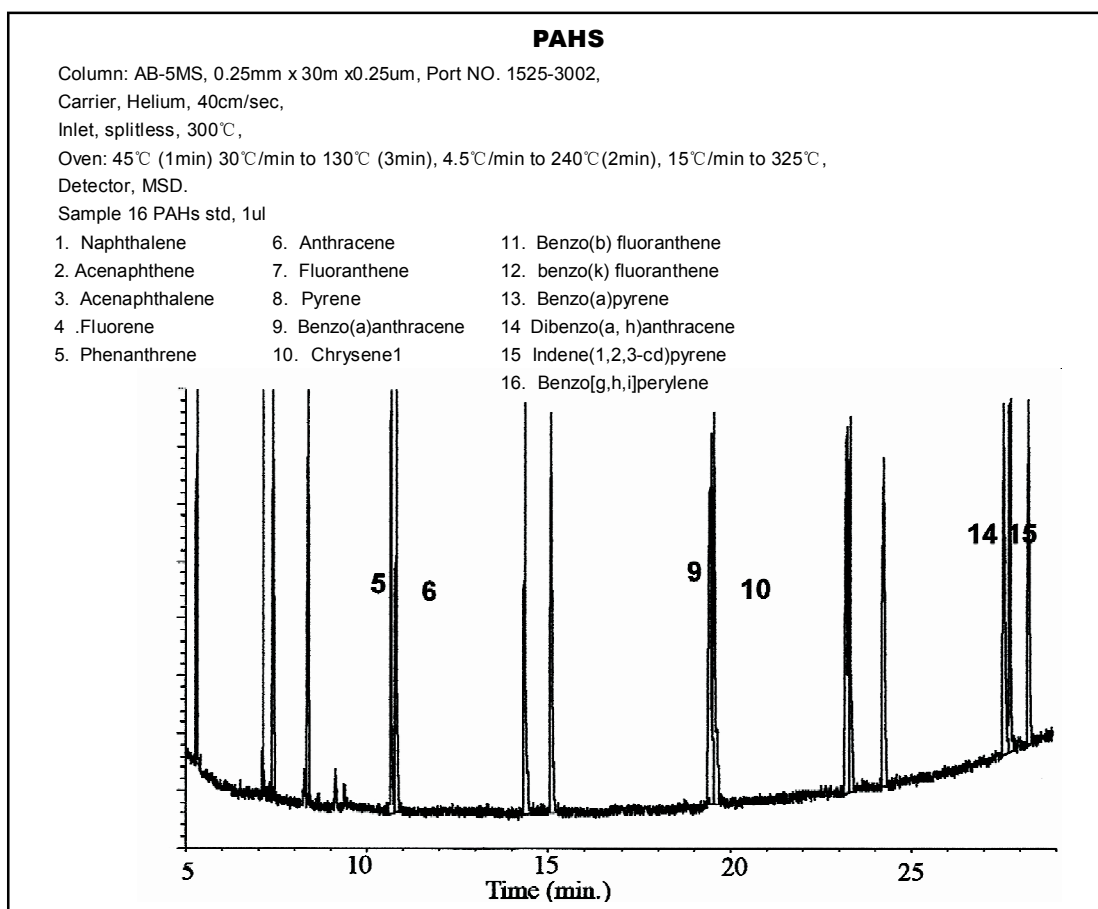


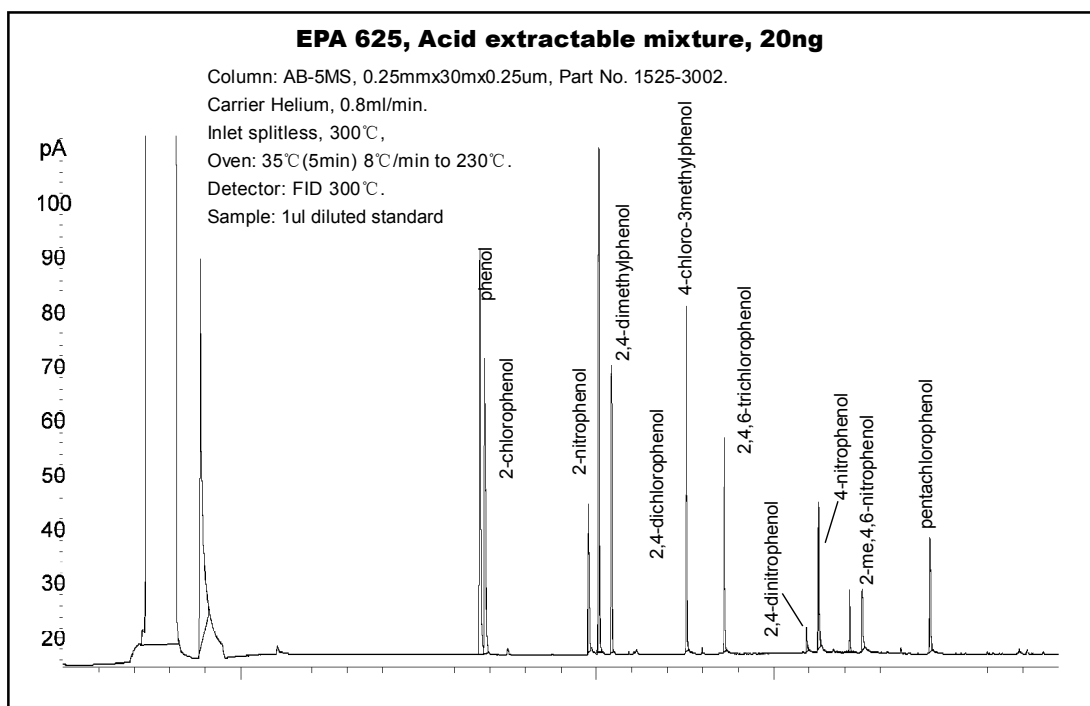
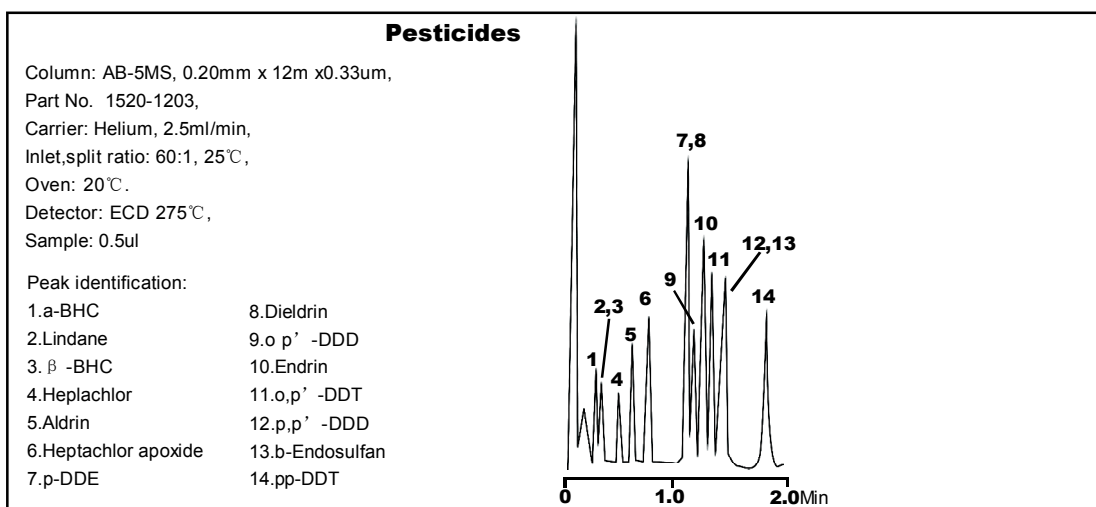




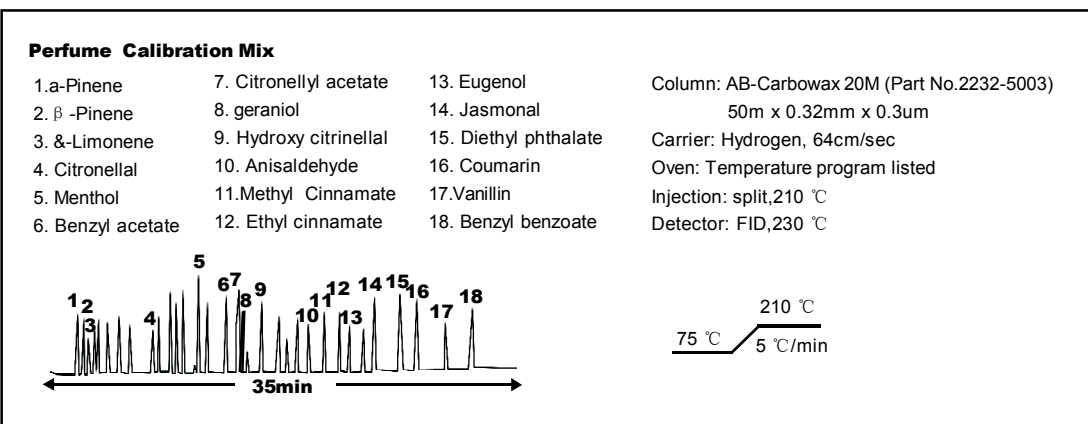
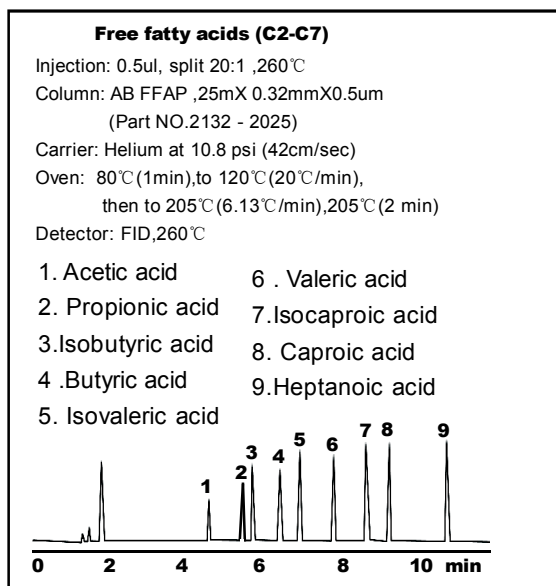
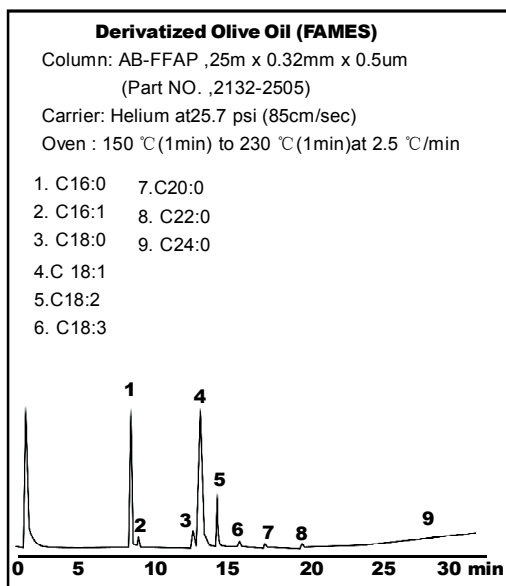
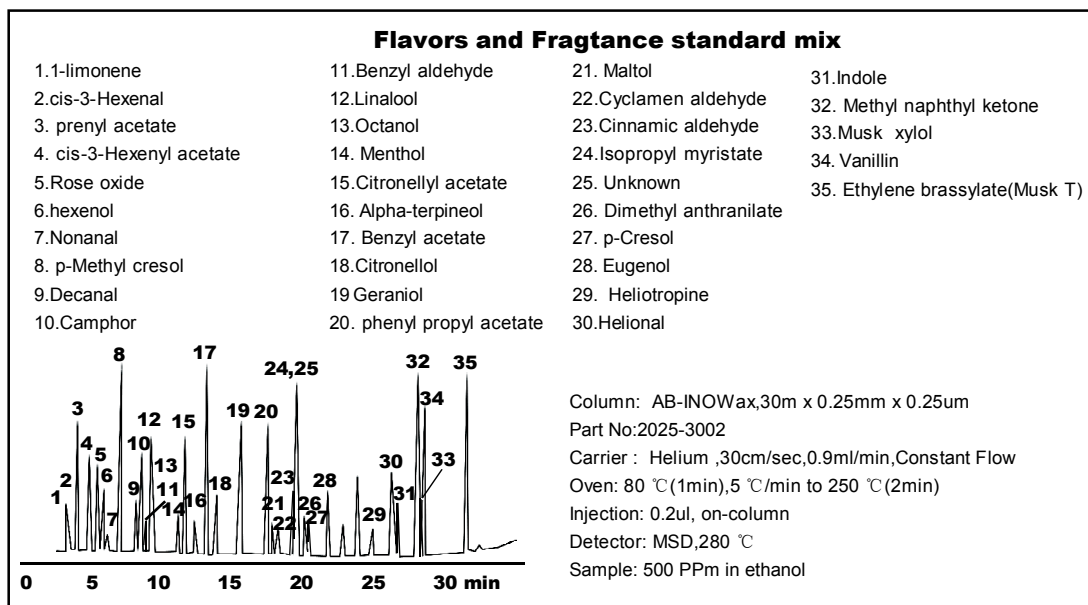


## ■ Environmental





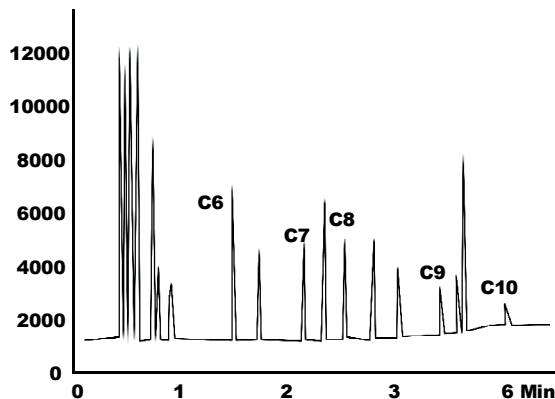
## Food and flavor



## ■ Petrochemical

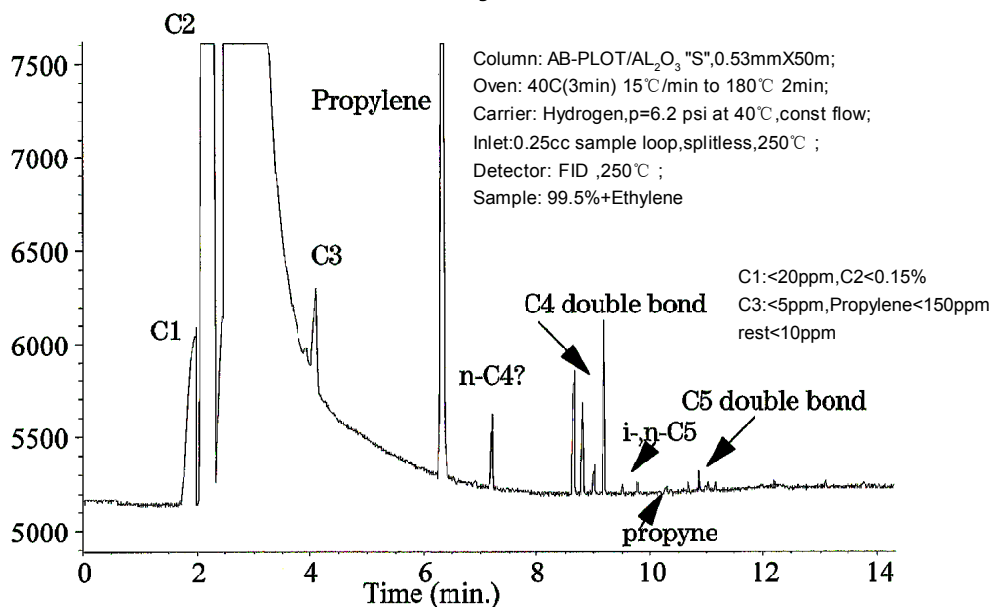
### Fast C1 to C10 Hydrocarbon Separations

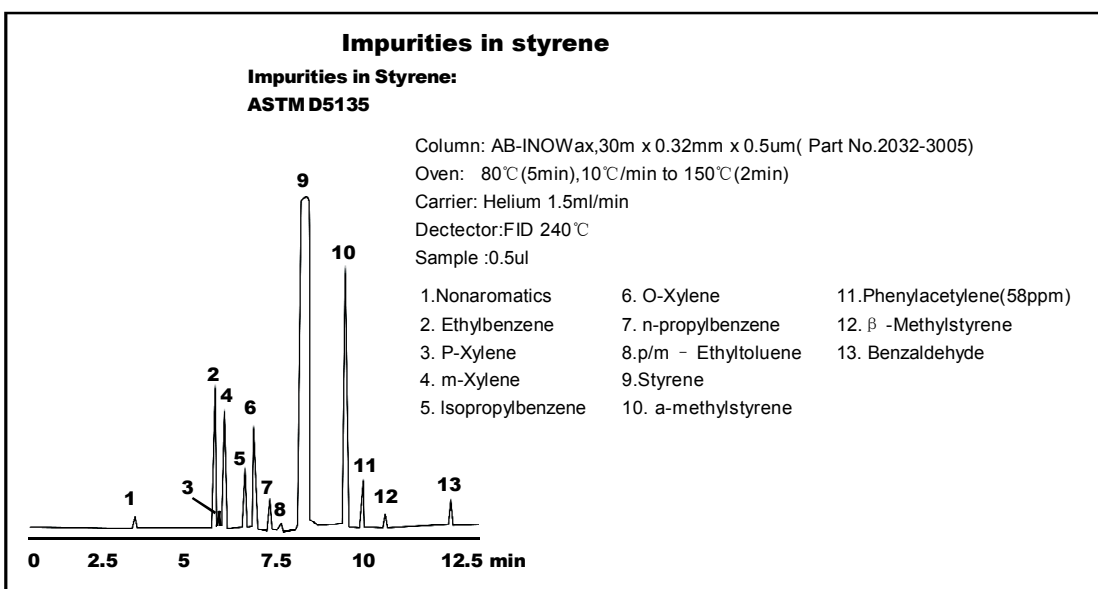
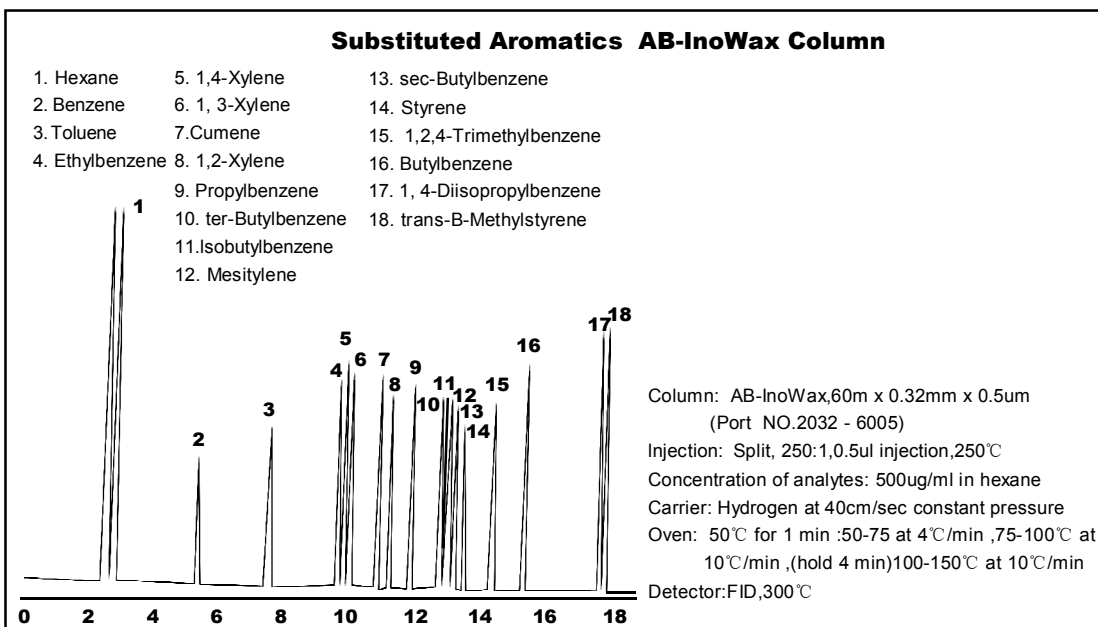
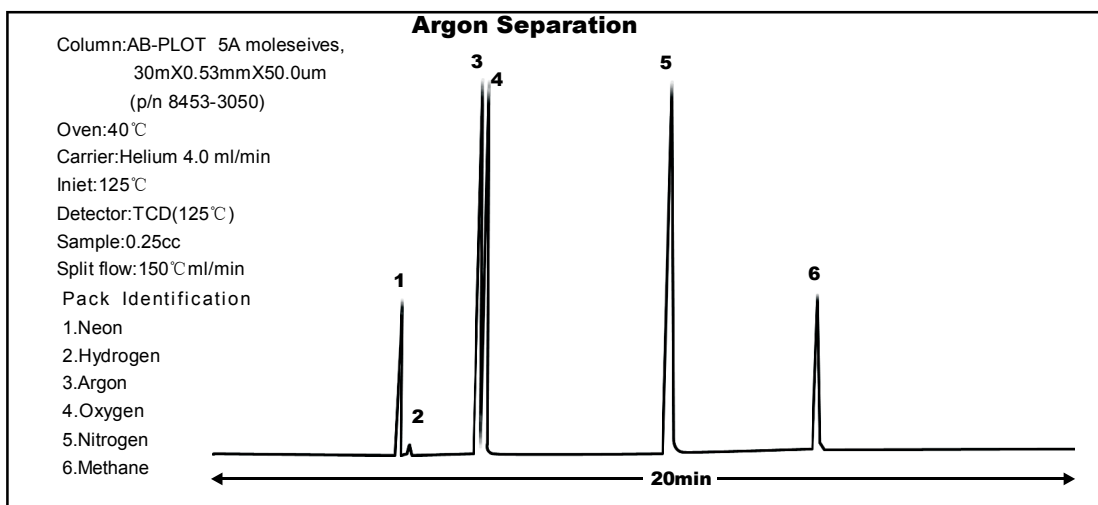
Column: 0.25mm x 30 m AB-PLOT /Al2O3 "KCL"  
 Oven: 110°C(0.5min) 25°C/min to 250°C (2min)  
 Carrier: Hydrogen P = 28psi at 100°C  
 Inlet: 250°C Split flow 120 min/min  
 Detector: FID 250  
 Sample: 5ul headspace gases

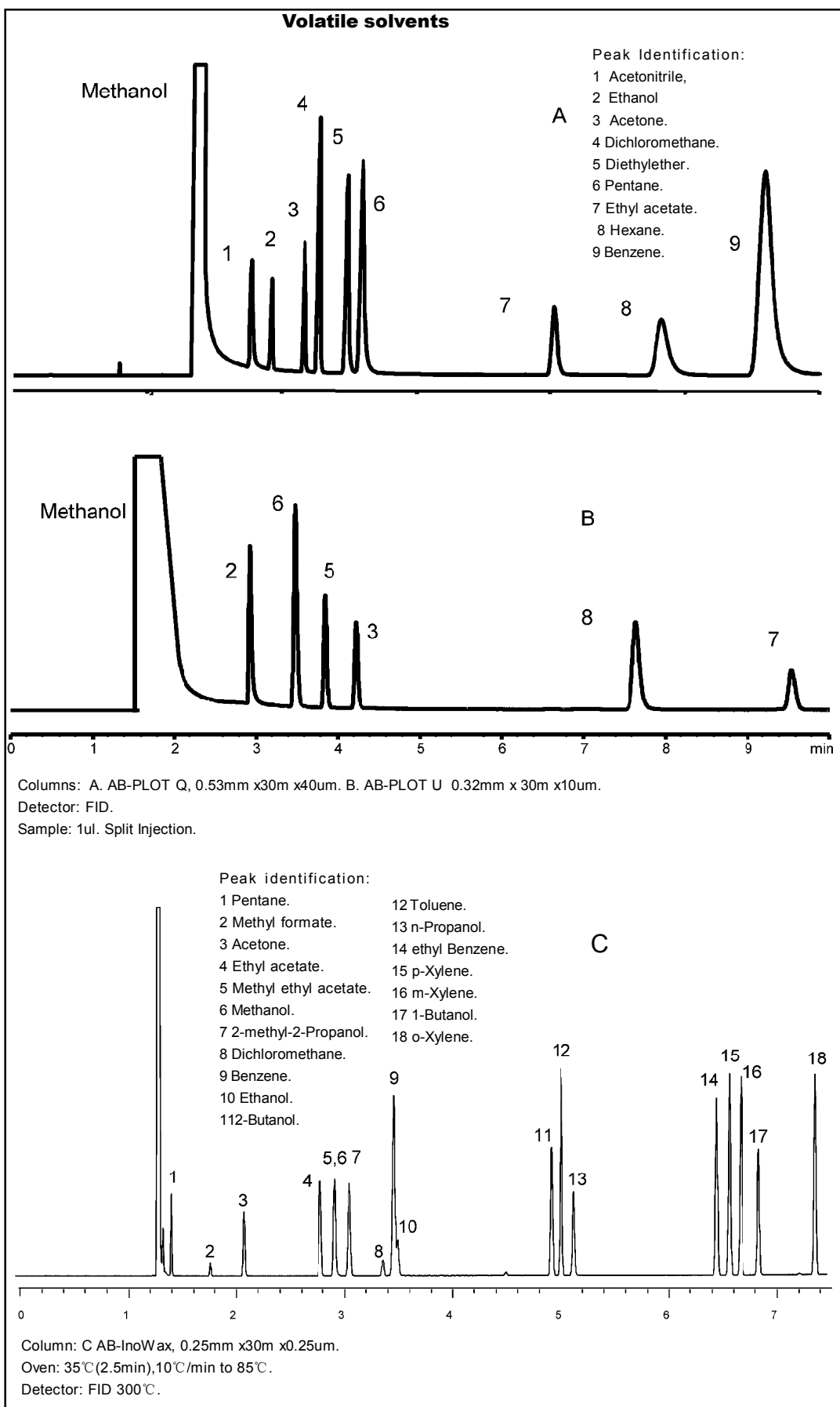


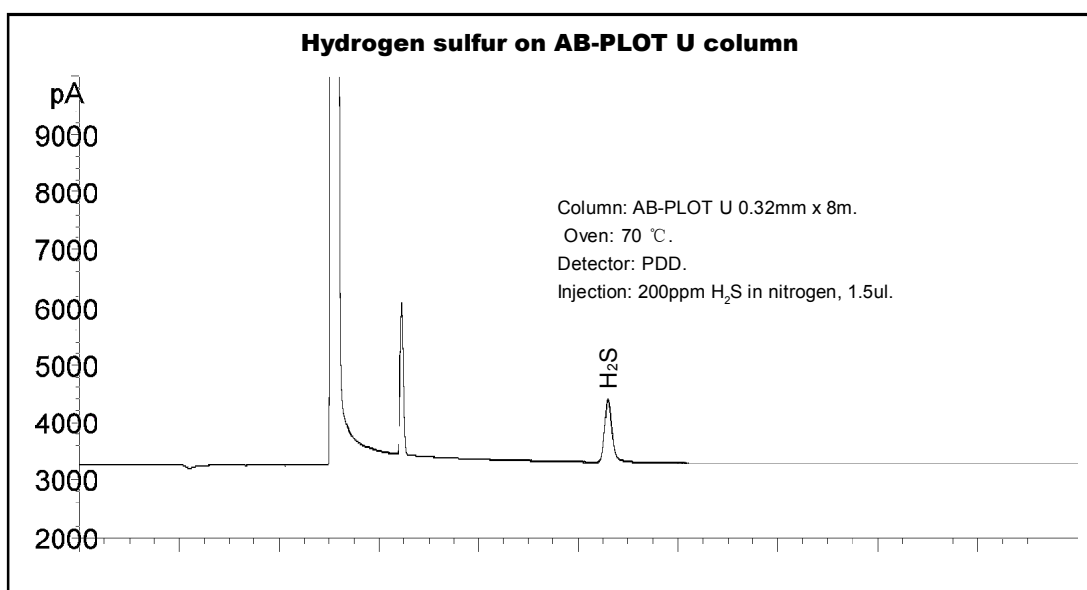
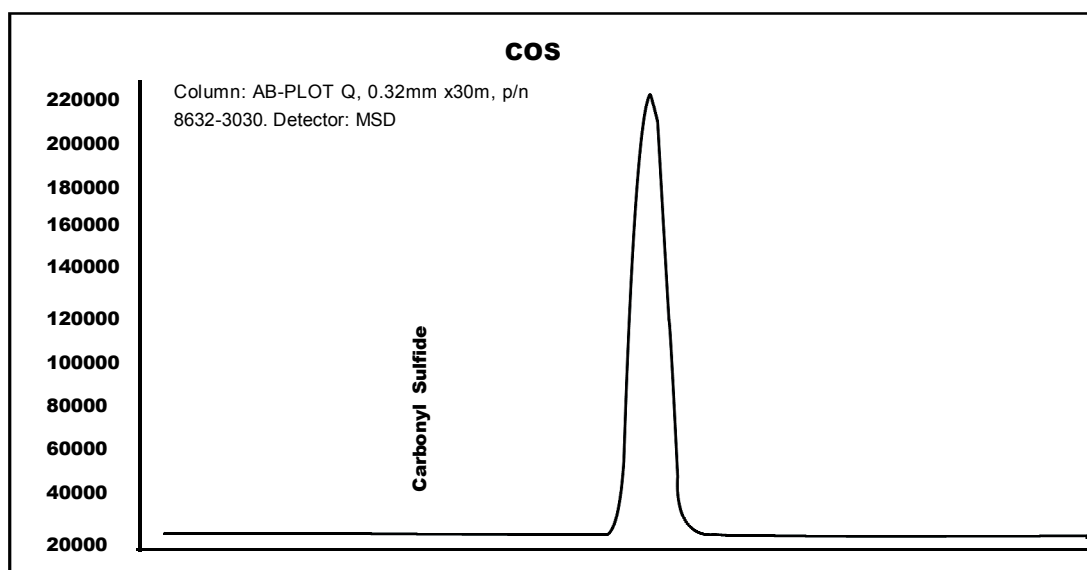
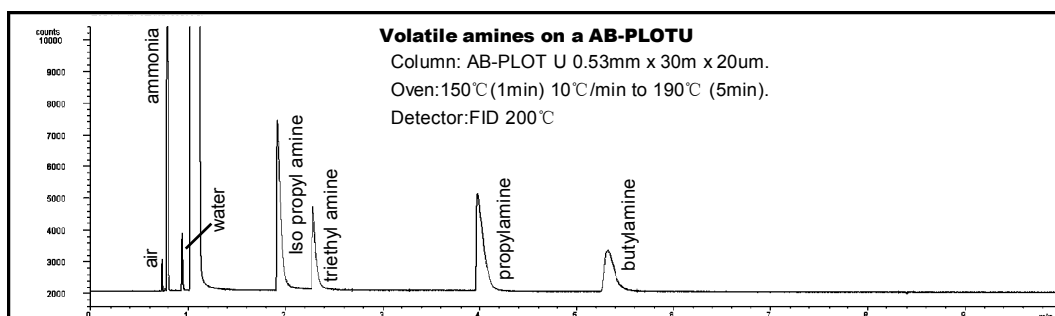
### Ethylene

Column: AB-PLOT/AL<sub>2</sub>O<sub>3</sub> "S", 0.53mmX50m;  
 Oven: 40°C(3min) 15°C/min to 180°C 2min;  
 Carrier: Hydrogen, p=6.2 psi at 40°C, const flow;  
 Inlet: 0.25cc sample loop, splitless, 250°C ;  
 Detector: FID ,250°C ;  
 Sample: 99.5%+Ethylene

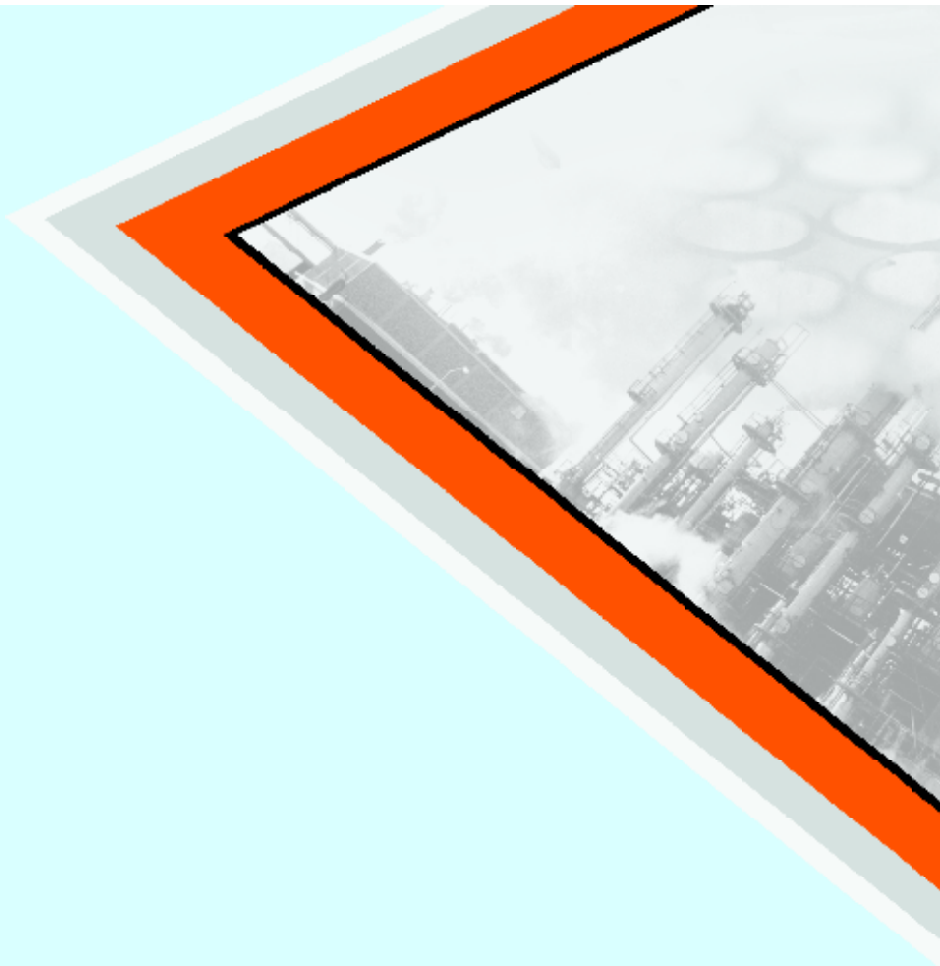












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