GS-Tek

GsBP-Wax-AQ Column Application Note

Current demanding GC and GC/MS applications have an increased focus on sensitive analysis of more challenging active analytes. We have successfully improved the inertness of the entire GC flow path by using Ultra Inert columns and system such as Ultra Inert liners, Gold Seals, split/splitless top. In this note, we present a new polyethylene glycol (PEG) GC Column GsBP-Wax-AQ 2632-3002 with improved aqueous resistance with little column performance degradation. Low levels of EG, free fatty acid and ethanol aqueous samples were tested in this method. Due to the chemical properties of these compounds, particularly the multiple active hydroxyl (-OH) functional groups and acid groups, their peaks often exhibit tailing when analyzed using traditional PEG stationary phase GC columns. We can supply this column for the special application according to customers' requirement.

In the 1st part, the free fatty acid as well as the EG separation was recorded. The instrumentation condition is shown as follows,

GC: Agilent 5890 w/ FID
Cat no: 2632-3002 GsBP-Wax-AQ 30m x 0.32mm x 0.25um
Oven: 80℃ 1min 20℃/min to 120℃ 6℃/min 205℃ 2min
Carrier: Hydrogen, 8psi
Inlet: Split, 240 ℃, split flow 50ml/min
Detector: FID 260 ℃
Samples: Free Fatty Acids Test Standard（Cat.#:35272）
Inject volume: 1ul

Free fatty acid separation was achieved on this column. The chromatogram and peak identification table are shown in figure 1 and table 1, respectively. The symmetry is nearly 1 for each component.

Figure 1. Chromatogram of free fatty acid separation on 2632-3002 GsBP-WaxAQ column

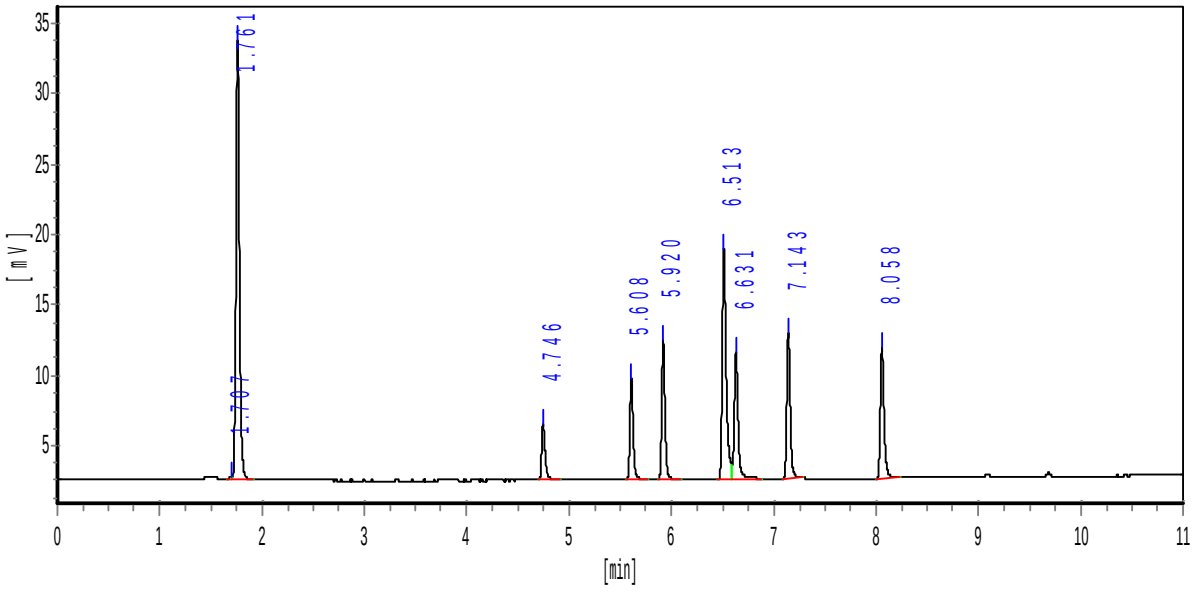
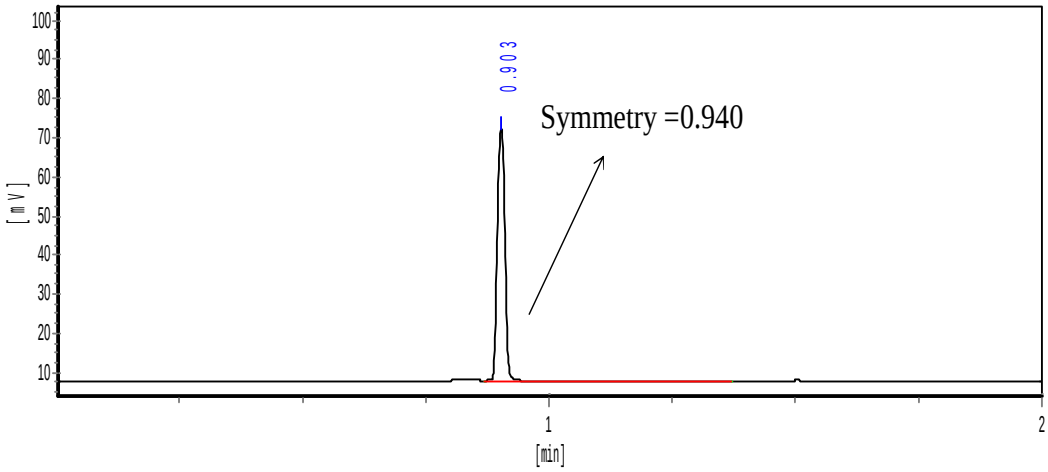


Table 1. Peak identification for free fatty acid separation in figure 1

Peak#	Compound	Retention Time	Symmetry
1	Acetic acid	4.746	1.246
2	Propionic acid	5.608	1.124
3	Isobutyric acid	5.92	1.012
4	Butyric acid	6.513	1.247
5	Isovaleric acid	6.631	1.126
6	Valeric acid	7.143	1.009

Peak shape of low level Ethylene Glycol (EG) in water on 2632-3002 GsBP-Wax-AQ is shown in figure 2 with a symmetry of 0.94.

Figure 2. Chromatogram of water sample with low level Ethylene Glycol (EG) analysis



In the 2nd part, ethanol separation was achieved on 2632-3002. Ethanol, methanol, acetone and acetic acid are not easily extracted from aqueous samples and the demand of such component analysis is highly increased, especially in liquor industry. Therefore, we provided the solvent analysis results with repeatability test.

The instrumentation condition is shown as follows,

GC: Agilent 7890 w/ FID
Cat no: 2632-3002 GsBP-Wax-AQ 30m x 0.32mm x 0.25um
Oven: 40℃ 4min 10℃/min to 200℃ 1min
Carrier: Hydrogen, 1.1ml/min
Inlet: Split, 240 ℃, split flow 40ml/min
Detector: FID 260 ℃
Samples: residual solvent mixture (ethanol, methanol, acetone, acetic acid) in water,the concentrations of these solvents are around 20-100ppm
Inject volume: 1ul

Figure 3. Chromatogram of residual solvent analysis

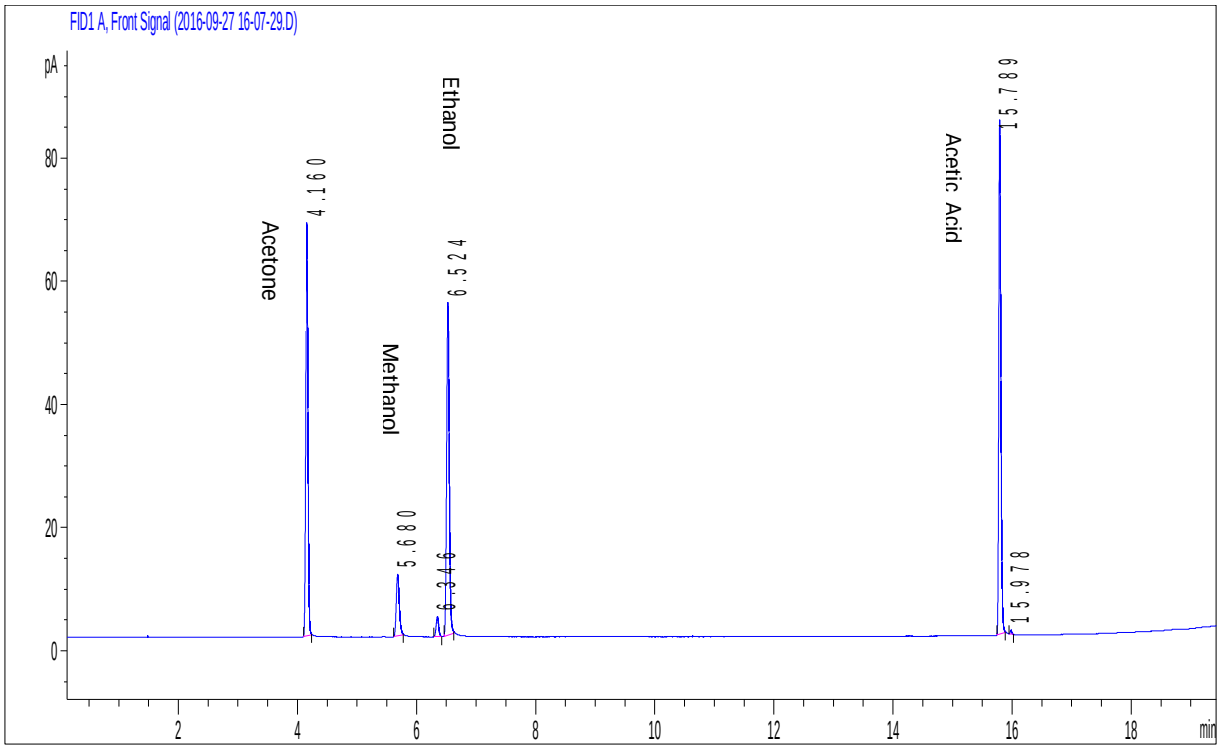
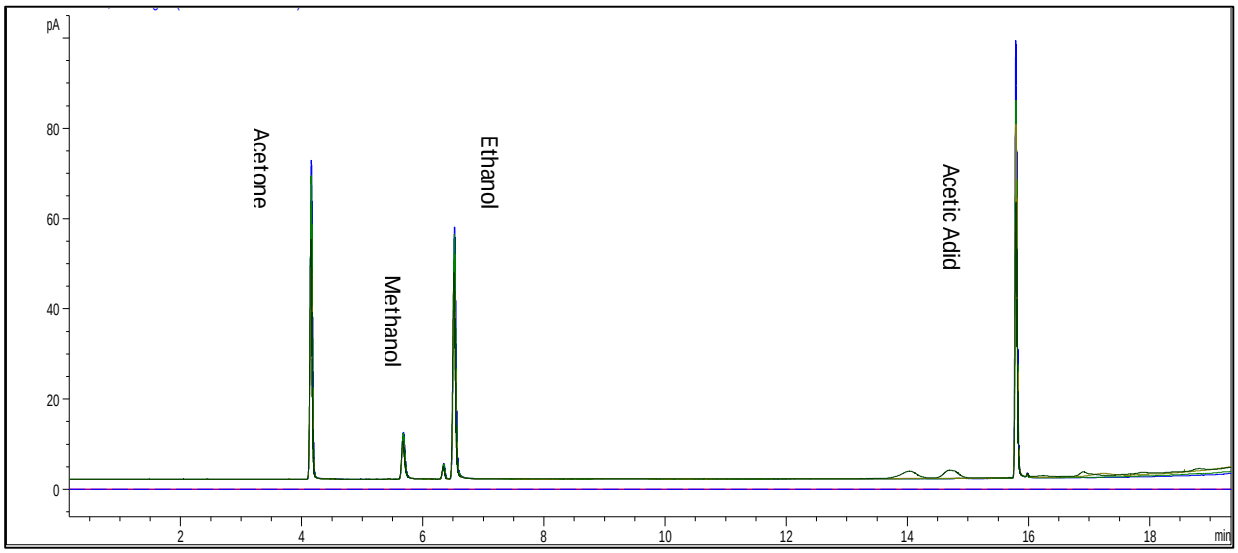


Table 2. Peak identification for solvent analysis in figure 3

Peak#	Compound	Retention Time	Symmetry
1	Acetone	4.180	0.946
2	Methanol	5.680	0.895
3	Ethanol	8.524	0.940
4	Acetic acid	15.789	0.887

Besides, we monitored the first three injections as well as the last three injections during 50 times injection. The repeatability result was shown below,

Figure 4. Chromatogram of repeatability test



The chromatogram showed that there was no time shift after repeated injections, which means the results should be consistent and the lifetime was not significantly reduced even if the samples contained some “active” components.

In the 3rd part, we want to discuss the separation of a critical pair, benzene and ethanol. The instrumentation condition is shown as follows,

GC: Agilent 7890 w/ FID
Cat no: 2632-3002, GsBP-Wax-AQ, 30m x 0.32mm x 0.25um
Oven: 48℃
Carrier: Hydrogen, 1.1ml/min
Inlet: Split, 240 ℃, split flow 40ml/min
Detector: FID 260 ℃
Samples: benzene/ethanol sample
Inject volume: 1ul

Figure 5. Chromatogram of benzene and ethanol separation

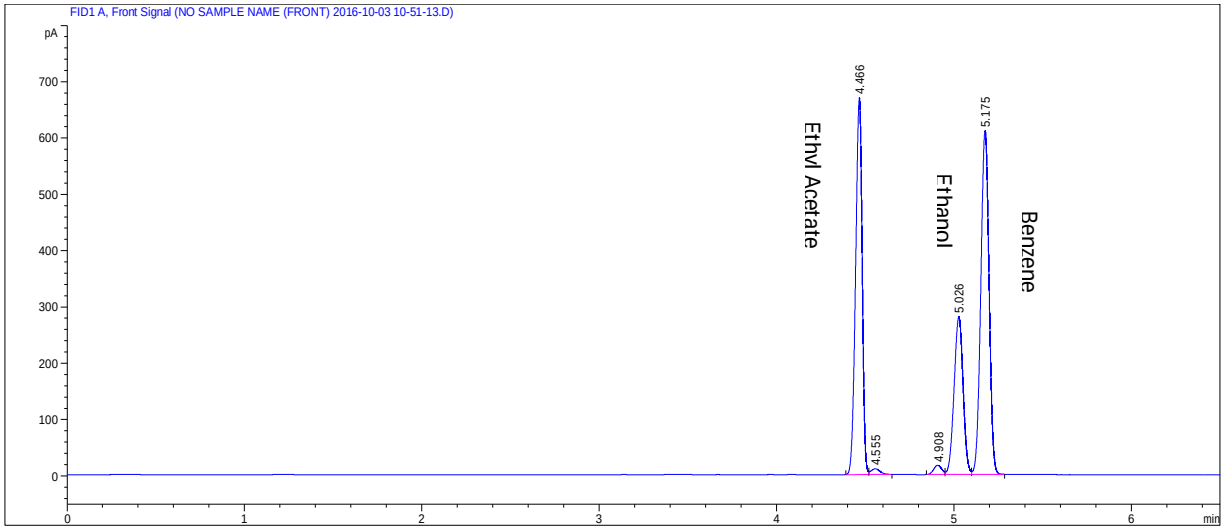


Table 3. Peak identification of benzene/ethanol separation in figure 5

Peak#	Compound	Retention Time	Resolution
1	Ethyl acetate	4.466	
2	Ethanol	5.026	
3	Benzene	5.175	2.814

Baseline separation of Benzene and ethanol can be achieved on 2632-3002 with good peak shape even when a large amount of sample was injected. If the customer wants the higher resolution results, we could recommend the columns with higher film thickness, such as 2632-3005 GsBP-Wax-AQ, 30m x 0.32mm x 0.5um.

Conclusion:

After correct installation and clean system, our columns could have good internes. 1) Free fatty acid separation could be achieved with improved peak shapes. 2) With repeated injection of ethanol/acid sample, the column also could provide a reliable separation result with repeatability. 3) A critical pair: benzene/ ethanol could be completely separated using this column with a large amount of injection.

THANKS for your interest in our products.

Zoe Wang

General Separation Technologies, Inc.

625 Dawson Drive, Suite A

Newark, DE 19713 USA

Cel: (302) 220-8946

Tel: (302) 533-5646

Fax: (302) 737-4547

Website: www.gs-tek.com

Emaill: zoe_w@gs-tek.com

THANKS for your interest in our products.

Zoe Wang
General Separation Technologies, Inc.
625 Dawson Drive, Suite A
Newark, DE 19713 USA
Tel: (302) 533-5646
Fax: (302) 737-4547
Website: www.gs-tek.com
Emaill: zoe_w@gs-tek.com