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Supelco SLB®-IL60 Ionic Liquid GC Columns

Improved Resolution

The variety of analyte-phase interactions possible with the SLB-IL60 column can be leveraged to provide improved separations. This is especially true for complex mixtures comprised of compounds with varying functionality. Polyethylene glycol (PEG) columns rate at 50-52 on our GC Column Polarity Scale; whereas, the SLB-IL60 column has a 60 rating. Therefore, the SLB-IL60 column will exhibit 'wax-like' selectivity for many compound classes. However, the higher rating (60 compared to 50-52) does create subtle selectivity differences which are advantageous for many applications, such as multi-component industrial solvent mixtures.

The SLB-IL60 column was compared directly to five popular commercially available PEG columns, each from a different manufacturer. All columns were 30 m x 0.25 mm I.D., 0.25 µm dimensions, except the SLB-IL60 column, which has a 0.20 µm film thickness. **Table 1** shows the maximum temperature limits for all columns tested. Complete specifications of SLB-IL60 columns are shown in **Table 2**.

Table 1. Maximum Temperature Limits *

Column	Isothermal	Programmed
PEG 1	280 °C	280 °C
PEG 2	260 °C	270 °C
PEG 3	250 °C	260 °C
PEG 4	250 °C	260 °C
PEG 5	280 °C	300 °C
SLB-IL60	300 °C	300 °C

* Obtained from paperwork included with commercial columns.

Table 2. SLB-IL60 Column Specifications

- Application: The SLB-IL60 polar ionic liquid column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but different enough to provide a unique elution pattern. It also has a higher maximum temperature of 300 °C, compared to 250-280 °C for most PEG columns. These features make it an excellent alternative to existing 'wax' columns. The combination of a high thermal limit and an orthogonal selectivity to non-polar columns also makes it a good GCxGC column choice. Launched in 2012.
- USP Code: None
- Phase: Non-bonded; proprietary
- Temp. Limits: 35 °C to 300 °C (isothermal or programmed)

Industrial Solvents

A 56-component industrial solvent mix that contained alcohols, aldehydes, aromatics, chlorinated hydrocarbons, esters, ethers, ketones, and nitrogen-containing compounds was analyzed on each column under identical conditions. All five PEG columns produced almost identical chromatography. **Figure 1** and **Figure 2** (see back page) show the chromatograms obtained from the PEG 1 and SLB-IL60 columns, respectively. Observations are that the SLB-IL60 column provides:

- An overall quicker analysis (22 minutes compared to 26 minutes)
- A vastly different elution pattern
- Resolution of more analytes; three co-elutions (6 compounds total) compared to six co-elutions (12 compounds total)
- Resolution of a contaminant peak (peak c), suspected to be 2-methylbutyl acetate, from isoamyl acetate (peak 35)

Conclusion

Columns based on polyethylene glycol phase chemistry are widely used for a variety of applications (such as solvents and FAMEs). However, modification of PEG phase chemistry to affect selectivity is very limited. It is advantageous to possess columns with alternative selectivity, because resolution can be greatly affected by selectivity. The SLB-IL60 column is able to undergo many of the same analyte-phase interactions as PEG columns, plus some additional interactions. This results in the SLB-IL60 column being similar enough to PEG columns to make it useful for many of the same applications, but different enough to impart unique selectivity which can be leveraged to change elution patterns and/or improve resolution.

Featured Products

Description	Cat. No.
SLB-IL60, 15 m x 0.10 mm I.D., 0.08 µm	29503-U**
SLB-IL60, 30 m x 0.25 mm I.D., 0.20 µm	29505-U
SLB-IL60, 60 m x 0.25 mm I.D., 0.20 µm	29506-U**
SLB-IL60, 30 m x 0.32 mm I.D., 0.26 µm	29508-U**
SLB-IL60, 60 m x 0.32 mm I.D., 0.26 µm	29509-U**

**Products will be available soon.
Visit **sigma-aldrich.com/il-gc** for updates.

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Figure 1. Industrial Solvents on PEG

column: PEG 1, 30 m x 0.25 mm I.D., 0.25 µm
oven: 40 °C (4 min), 8 °C/min to 200 °C (5 min)
inj. temp.: 250 °C
carrier gas: helium, 30 cm/sec
detector: FID, 250 °C
injection: 1 µL, 100:1 split
liner: 4 mm I.D., split/splitless type, single taper wool packed FocusLiner™ design
sample: 56-component industrial solvent mix, each analyte at 0.2 % (v/v) in pentane

1. Hexane
2. 1,1-Dichloroethylene
3. Methyl formate
4. Acetone
5. Ethyl formate
6. Methyl acetate
7. trans-1,2-Dichloroethylene
8. Tetrahydrofuran
9. Carbon tetrachloride
10. 1,1,1-Trichloroethane
11. 1,1-Dichloroethane
12. Ethyl acetate
13. Methanol
14. Isopropyl acetate
15. 2-Butanone
16. 2-Propanol
17. Methylene chloride
18. Ethanol
19. Benzene
20. *n*-Propyl acetate
21. Trichloroethylene
22. 4-Methyl-2-pentanone
23. Isobutyl acetate
24. Tetrachloroethene
25. Chloroform
26. sec-Butanol
27. Toluene
28. *n*-Propanol
29. 1,4-Dioxane
30. 1,2-Dichloroethane
31. *n*-Butyl acetate
32. 2-Hexanone
33. Isobutanol
34. Nitropropane
35. Isoamyl acetate
36. Ethylbenzene
37. Mesityl oxide
38. *p*-Xylene
39. *m*-Xylene
40. 5-Methyl-2-hexanone
41. *n*-Butanol
42. *n*-Amyl acetate
43. *o*-Xylene
44. Isoamyl alcohol
45. Chlorobenzene
46. Styrene
47. 1,1,1,2-Tetrachloroethane
48. Dimethylformamide
49. Diacetone alcohol
50. Cyclohexanol
51. 2-Butoxyethanol (Butyl cellosolve)
52. 1,4-Dichlorobenzene
53. 1,1,2,2-Tetrachloroethane
54. 2-Methylphenol
55. 3-Methylphenol
56. 4-Methylphenol

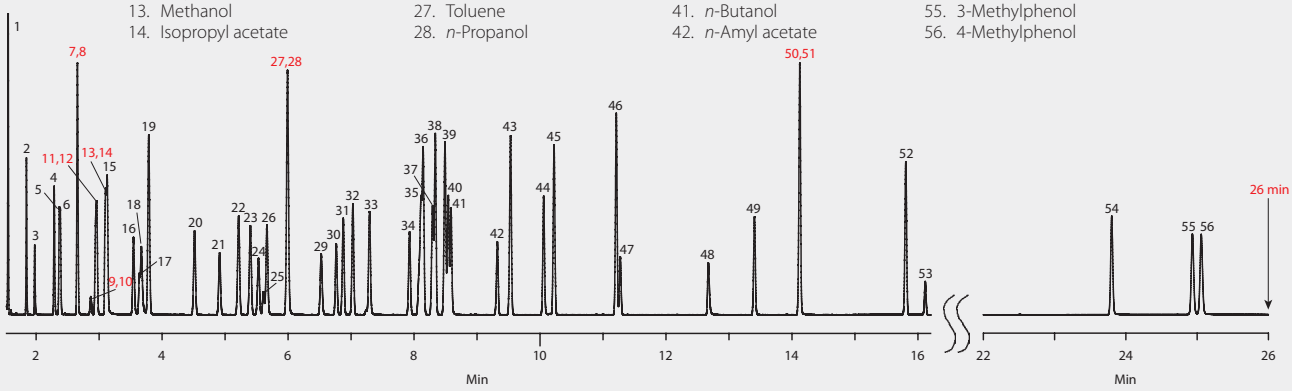
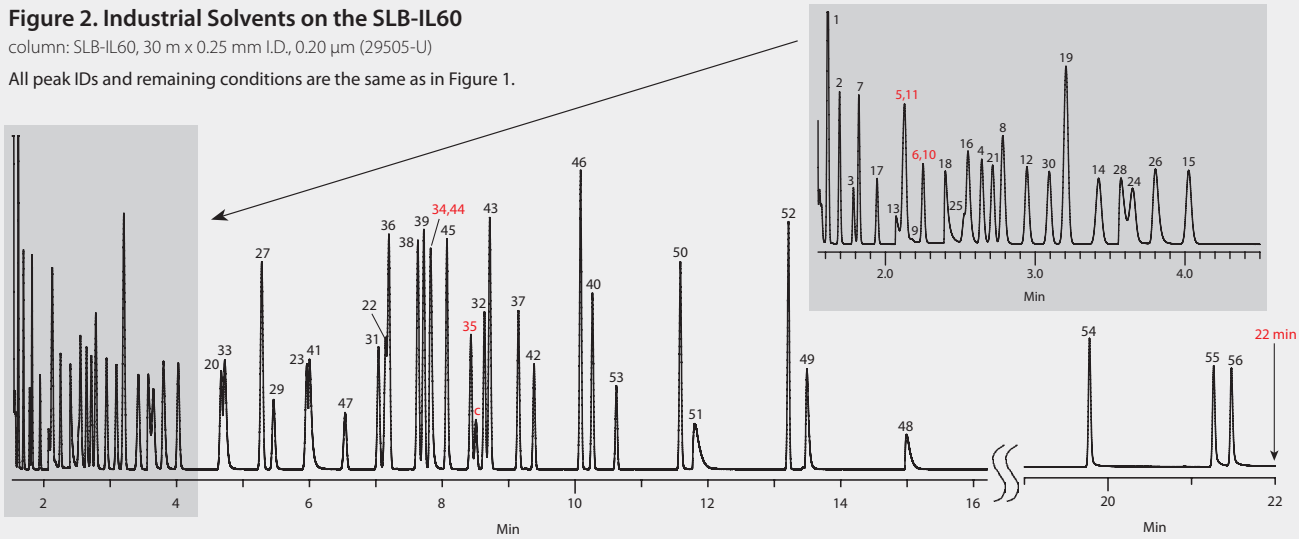


Figure 2. Industrial Solvents on the SLB-IL60

column: SLB-IL60, 30 m x 0.25 mm I.D., 0.20 µm (29505-U)

All peak IDs and remaining conditions are the same as in Figure 1.



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