

Application

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Monitor Salicylic Acid Purity, Using USP XXII Method and a SUPELCOSM LC-18 HPLC Column

We compared the performance of SUPELCOSM LC-18 and SUPELCOSM LC-18-DB columns (5 μ m packing particles) for USP XXII purity analysis of salicylic acid preparations. The ability to resolve salicylic acid from three potential contaminants (4-hydroxybenzoic acid, 4-hydroxyisophthalic acid, phenol), the reproducibility of the separation, and close agreement of relative retention values to those presented in the USP monograph indicate that 10cm x 4.6mm SUPELCOSM LC-18 columns are well suited for this application. Either conventional or cartridge-style hardware is appropriate. (ChromFax: 394043)

Key Words:

- salicylic acid • USP methods

USP XXII describes a purity analysis for salicylic acid preparations, using a 10cm x 4.6mm USP L1 (octadecylsilyl) HPLC column (1). We compared the performance of two 5 μ m octadecylsilyl packings, SUPELCOSM LC-18 and SUPELCOSM LC-18-DB, in conventional and cartridge-style hardware, for their effectiveness in this application. SUPELCOSM LC-18-DB packing is deactivated for analyses of basic analytes.

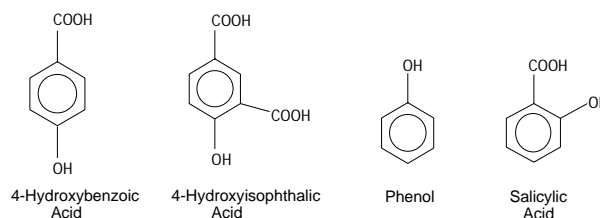
According to criteria in the USP method, salicylic acid (SA) and three potential impurities, 4-hydroxybenzoic acid (HBA), phenol (PHE), and 4-hydroxyisophthalic acid (HIA), must be resolved. A 10cm x 4.6mm SUPELCOSM LC-18 column, either conventional or cartridge-style, effectively resolved these analytes under the conditions described in the method (Figure A). Retention times were consistent between conventional and cartridge-style columns prepared from different silica lots and bonding lots (Table 1), and were remarkably close to the relative retention values described in the USP monograph (Table 2). Selectivity (α) values for the two styles of SUPELCOSM LC-18 columns also were very similar (Table 3).

The USP method specifies a 2 μ L injection of 50mg/mL salicylic acid preparation, to detect impurities present at low levels. Analysis of a concentrated sample on a SUPELCOSM LC-18 column is shown in Figure B.

A SUPELCOSM LC-18-DB column of the specified 10cm x 4.6mm dimensions cannot be used for this analysis because, in our investigations, HIA and phenol coeluted. This result was not surprising. The deactivated phase generally shows stronger interactions with acidic compounds than nondeactivated phases, due to differences in the populations of residual silanol groups (Si-OH vs. Si-O⁻) on the surfaces of the particles.

Figure A. Salicylic Acid and Potential Impurities on a SUPELCOSM LC-18 Column

Column: SUPELCOSM LC-18, 10cm x 4.6mm, 5 μ m particles
Cat. No.: 59209
Mobile Phase: methanol:water:acetic acid (40:60:1)
Flow Rate: 0.5mL/min
Det.: UV, 270nm
Inj.: 2 μ L of methanol:water:acetic acid (70:30:4) analyte concentrations listed on figure



1. 4-Hydroxybenzoic acid (50 μ g/mL)
2. 4-Hydroxyisophthalic acid (190 μ g/mL)
3. Phenol (250 μ g/mL)
4. Salicylic acid (1.25mg/mL)

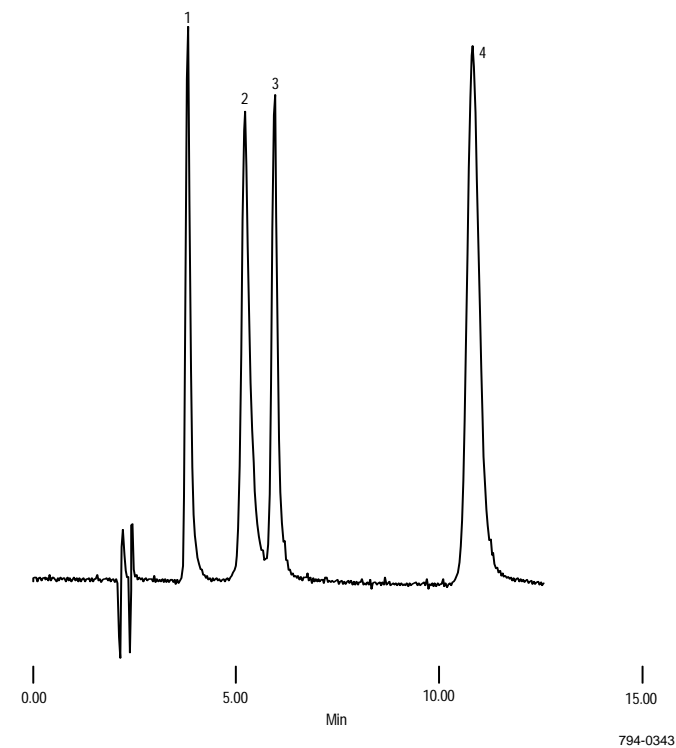


Table 1. Retention of Salicylic Acid and Potential Impurities on SUPELCOSIL Columns

SUPELCOSIL Phase	Hardware Type [▲]	Silica Lot	Retention Time (Min)			
			HBA	HIA	PHE	SA
LC-18	conventional	A	3.75	5.12	5.91	10.81
LC-18	cartridge	B	3.71	5.12	5.92	10.79
LC-18-DB	conventional	A	4.01	6.44	6.44	12.76

[▲]10cm x 4.6mm columns, conditions listed on Figure A.

Table 2. SUPELCOSIL LC-18 Column Meets USP XXII Relative Retention Criteria

Compound	Relative Retention [•]	
	USP	SUPELCOSIL LC-18 [▲]
4-Hydroxybenzoic acid	0.35	0.33
4-Hydroxyisophthalic acid	0.45	0.47
Phenol	0.50	0.53
Salicylic acid	1.00	1.00

[•]Retention time for compound divided by retention time for salicylic acid.

[▲]10cm x 4.6mm conventional column, conditions listed on Figure A.

Table 3. Consistent Selectivity for SUPELCOSIL LC-18 Columns

SUPELCOSIL Phase	Hardware Type [▲]	Selectivity (α)					
		HIA/HBA	PHE/HIA	PHE/HBA	SA/PHE	SA/HIA	SA/HBA
LC-18	conventional	1.53	1.20	1.84	2.04	2.44	3.75
LC-18	cartridge	1.56	1.20	1.87	2.03	2.44	3.80
LC-18-DB	conventional	1.86	1.00	1.86	2.20	2.20	4.09

[▲]10cm x 4.6mm columns, conditions listed on Figure A.

The ability to resolve salicylic acid from potential contaminants, the reproducibility of the separation, and the close agreement of relative retention values to those presented in the monograph indicate that 10cm x 4.6mm SUPELCOSIL LC-18 columns are well suited for use in the USP XXII Method for monitoring salicylic acid purity. Either conventional or cartridge-style hardware is appropriate. Supelguard™ guard columns for SUPELCOSIL LC-18 columns also are listed here. Although the USP method does not mention guard columns, we strongly recommend using one whenever possible.

Reference

1. Official Monographs, U.S. Pharmacopeia National Formulary, USP XXII, NF XVII, Ninth Supplement.

Acknowledgment

Salicylic acid, 4-hydroxybenzoic acid, 4-hydroxyisophthalic acid, and phenol samples were generously provided by Michael Spangler, PACRD, Schering-Plough, Kenilworth, New Jersey, USA.

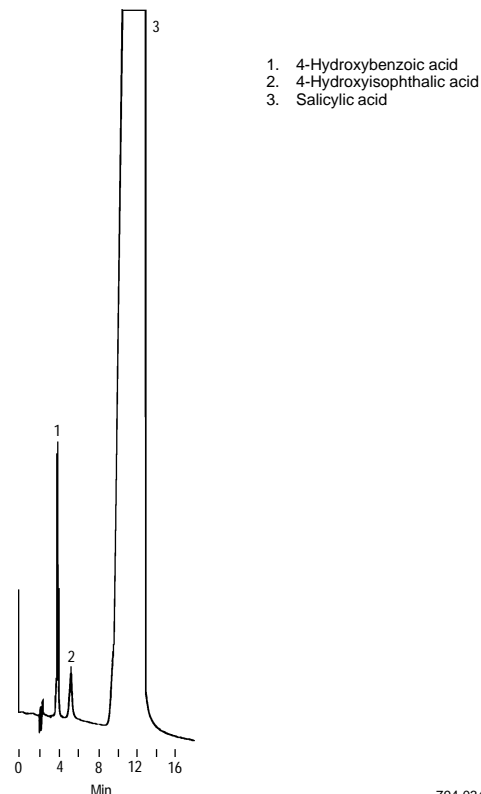
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Figure B. Salicylic Acid and Potential Impurities Under High-Concentration Conditions of USP XXII Method

Column: SUPELCOSIL LC-18, 10cm x 4.6mm, 5µm particles
 Cat. No.: 59209
 Mobile Phase: methanol:water:acetic acid (40:60:1)
 Flow Rate: 0.5mL/min
 Det.: UV, 270nm
 Inj.: 2µL of methanol:water:acetic acid (70:30:4) containing 50mg/mL salicylic acid preparation



794-0344

Ordering Information:

SUPELCOSIL LC-18 HPLC Columns

10cm x 4.6mm (USP L1)
 Conventional Design **59209**
 Cartridge Design **59209-C46**
 Requires reusable cartridge end fittings (Cat. No. 5-5200).
 Cartridge End Fittings (pk. of 2) **55200-U**

Supelguard LC-18 Guard Column Kit

2cm x 4.6mm column, column holder,
 hardware to connect holder to 1/16" tubing **59554**

Supelguard LC-18 Columns (pk. of 2) 59564

Cartridge Guard Column Holder 55205
 connects guard column directly to cartridge column

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