

The most reliable LC-EC applications for Antibiotics analysis

Aminoglycosides

Amikacin
Framycetin Sulphate
Gentamicin Sulphate
Kanamycin Sulphate
Lincomycin
Neomycin
Spectinomycin
Tobramycin

Macrolide antibiotics

Azithromycin
Azaerythromycin
Clarithromycin
Erythromycin
Roxithromycin

Spectinomycin in Pharmaceutical Preparations

- **European Pharmacopoeia 6.0 (2008) used as basis for this application.**
- **FlexCell with exchangeable gold electrode**
- **Analysis of main substituent and impurities**
- **Reproducible & robust**

Summary

The ALEXYS[®] Aminoglycosides Analyzer is a dedicated LC solution for the analysis of Spectinomycin, which matches the EP requirements for peak resolution and repeatability of the principal peak. The European Pharmacopoeia, 6.0, (2008), 2947-2949 was used as a basis to set-up this method. In this application note typical results obtained with the Aminoglycosides Analyzer are reported demonstrating its performance for the analysis of impurities in Spectinomycin bulk drugs.

Introduction

Spectinomycin is an aminoglycoside-like antibiotic produced by *Streptomyces spectabilis*. In solution, spectinomycin will undergo a ring opening and closing of the hemiketal function, resulting in an equilibrium mixture of four possible anomers. Hydrolysis with acid produces actinamine and in basic solutions actinospectinoic acid (ASA) is formed. Important fermentation impurities are dihydrospectinomycin and dihydroxyspectinomycin [1, 2]. Because of the presence of glycoside groups in Spectinomycin and by-products, LC with pulsed amperometric detection (PAD) has been applied for analysis [3]. Conditions are to a large extent in correspondence with the EP requirements [4,5].



Figure 1: ALEXYS Aminoglycosides Analyzer for Spectinomycin.

Method

Solutions and standards are prepared as described in the EP method [4,5]. Assay validation was done with special attention to EP requirements.

Table 1

Conditions	
HPLC	ALEXYS Aminoglycosides Analyzer
Flow rate	1 mL/min, post-column: 0.5 mL/min
Flow cell	FlexCell™ with Au WE and HyREF™
Temperature	35 DC for separation and detection
Range	2 $\mu\text{A/V}$
ADF	0.5 Hz
I-cell	about 2 μA

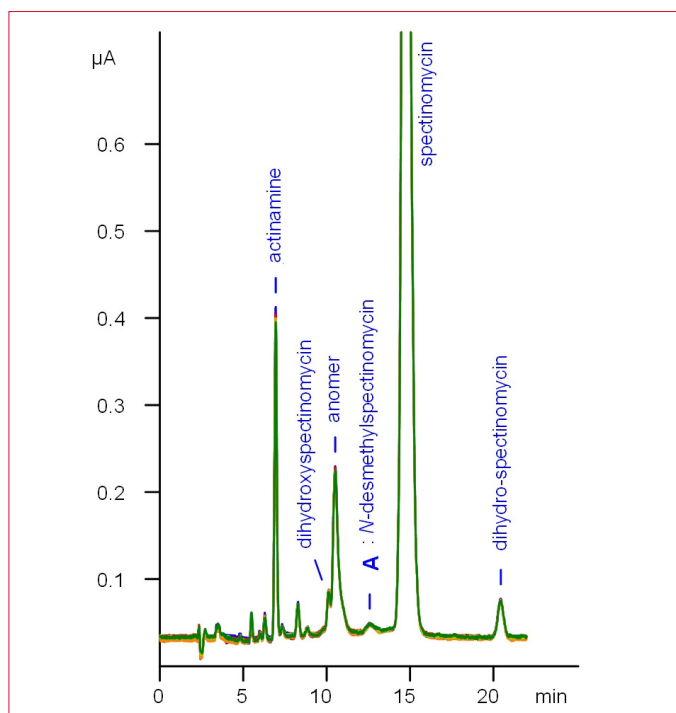


Figure 2: Overlay (n=6) of 20 μL injections of 80 mg/L Spectinomycin-HCl in mobile phase (diluted from 800 mg/L Spectinomycin in water, standing time 68 h).

LC-EC conditions (complete)

Table 3 LC-EC Conditions	
HPLC	ALEXYS Aminoglycosides analyzer (part no.180.0050A)
Sample	20 μL
Flow rate	1 mL/min, post-column: 0.5 mL/min
Mobile phase	47 mM oxalic acid, 15 mM heptafluorobutyric acid, set to pH 3.2 with 19 M NaOH, addition of acetonitril (10% v/v)
Post-column	0.54 mol/L NaOH
Column	ALA-525: 4.6 x 250 mm, 5 μm
Temperature	35 $^{\circ}\text{C}$ for column, mixing and detection
E-cell	E1, E2, E3: 0.12, 0.70, -0.60 V ts, t1, t2, t3: 0.2, 0.4, 0.2, 0.4 s
I-cell	ca. 2 μA



Results

In the EP monographs for Spectinomycin [4.5] two system suitability requirements are specified:

[1] Peak resolution: between impurity E and the principle peak (Spectinomycin), $R > 1.5$.

[2] Repeatability: maximum RSD(%) for the principle peak, $n=6$ injections, $RSD > 3\%$.

In Table 2 the criteria of the EP are compared with the typical results obtained with the ALEXYS Aminoglycosides Analyzer.

Table 2

EP system suitability requirement		
Parameter	EP criteria	Result
RSD of principal peak	< 3.0 %	1.0 %
Resolution, peak 'A'	> 1.5	2.5

Table 2. Performance ALEXYS aminoglycosides Analyzer versus EP system suitability requirements.

It is evident from table I that the EP requirements for both peak resolution and repeatability are met by the ALEXYS aminoglycosides Analyzer.

Conclusion

The ALEXYS Aminoglycosides Analyzer provides a reliable solution for the routine analysis of Spectinomycin in Pharmaceutical Preparations. It meets the EP system suitability requirement for resolution and repeatability.



Spectinomycin in Pharmaceutical Preparations

References

1. J. Szunyog, E. Adams, K. Liekens, E. Roets, J. Hoogmartens, *Journal of Pharmaceutical and Biomedical Analysis*, 29 (2002) 213–22.
2. D. Debremaeker, E. Adams, E. Nadal, B. Van Hove, E. Roets, J. Hoogmartens, *Journal of Chromatography A*, 953 (2002) 123–132
3. W.R. LaCourse, "Pulsed Electrochemical Detection in High Performance Liquid Chromatography", *John Wiley & Sons, New York*, 1ed,1997.
4. "Spectinomycin Dihydrochloride Pentahydrate", *European Pharmacopoeia*, 6.0, (2008) 2947-2949
5. "Spectinomycin Sulphate Tetrahydrate for veterinary use", *European Pharmacopoeia*, 6.0, (2008) 2949 -2951

Ordering information

180.0050W	Aminoglycoside Analyzer including Flowcell
250.1070	ALA-525 C18 column, 250x4.6mm, 5um

For research purpose only. The information shown in this communication is solely to demonstrate the applicability of the ALEXYS system. The actual performance may be affected by factors beyond Antec's control. Specifications mentioned in this application note are subject to change without further notice.

Antec Scientific (USA)
info@AntecScientific.com
www.AntecScientific.com
T 888 572 0012

Antec Scientific (worldwide)
info@AntecScientific.com
www.AntecScientific.com
T +31 71 5813333

