X-ray powder diffraction data for alaptide, 8(S)-methyl-6,9-diazaspiro/4,5/decane-7,10-dione or cyclo(L-Alanyl-1-ami-no-1-cyclopentan carbonyl), cyclo(L-Ala-Acp)

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X-ray powder diffraction data, unit cell parameters, and space group for alaptide are presented (a =21.136(4) Å, b=7.212(4) Å, c=6.126(3) Å, space group $P2_12_12_1$, cell volume=933.8(8) Å^3, and Z=4). All measured lines were indexed and are consistent with the $P2_12_12_1$ space group. No detectable impurities were observed. © *2009 International Centre for Diffraction Data.* [DOI: 10.1154/1.3078425]

Key words: X-ray powder diffraction, crystal structure, alaptide

I. INTRODUCTION

Alaptide, 8(S)-methyl-6,9-diazaspiro/4,5/decane-7,10-dione or cyclo(L-Alanyl-1-amino-1-cyclopentancarbonyl), cyclo(L-Ala-Acp) (Figure 1), is a substance discovered in the eighties at Prague (Kacafírek *et al.*, 1986). Substance preparation, production procedures, and therapeutic application are protected by a number of patents in the Czech Republic and abroad (Šturc and Kacafírek, 1992).

The positive effect of alaptide on the central dopaminergic system was documented on behavior and memory of animals by testing. The positive influence on proliferative multiplying of the healthy cells was demonstrated in the tissue culture (e.g., in reducing the number of experimental gastrointestinal ulcers in rats, in the healing of burns) (Kacafírek *et al.*, 1992).

In the 1990s alaptide was ready for the third stage of the clinical testing for healing of burns and crural ulcers (gels, ointments). Alaptide is today manufactured mostly for veterinary and cosmetic purposes.

II. SAMPLE PREPARATION

Chemically pure alaptide is usually crystallized by a cyclization reaction of the methanol in the last step of production (Šturc and Kacafírek, 1992). It can be recrystallized from alcohols.

Alaptide exists as one solid form only. The test consisting in mixing in more than ten solvents did not reveal any polymorphism (as checked by IR and XRPD). The isolated crystals are platelike, so care must be taken to produce a nontextured sample.

The microcrystalline sample was carefully ground by agate mortar and pestle. The size of crystallites was initially checked by optical microscopy and later by collecting a diffraction image of the Debye–Scherrer rings on a capillary sample. The rings were continuous and no graininess was observed. The ground sample was then loaded into a glass cavity holder and measured in Bragg–Brentano parafocusing geometry.

III. POWDER DIFFRACTION DATA

The diffraction data for alaptide are presented in Table I; the diffraction pattern, shown in Figure 2, was collected at room temperature with an X'Pert PRO θ-θ powder diffractometer with parafocusing Bragg–Brentano geometry using Cu K_α radiation (λ=1.5418 Å, generator setting: 40 kV, 30 mA). An ultrafast X'Celerator detector was employed over the angular range 7° to 70° (2θ) with a step size of 0.017° (2θ) and a counting time of 81.28 s step^{-1}. Data evaluation was performed using the software package HIGHSCORE PLUS V 2.2, PANalytical, Almelo, Netherlands.

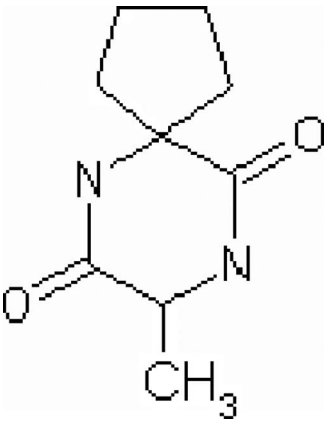

Figure 1. Structural formula of alaptide.

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TABLE I. Indexed X-ray powder diffraction data for alaptide. Only the peaks with I_{rel} of 1 or greater are given. Lattice parameters: a=21.136(4) Å, b=7.212(4) Å, c=6.126(3) Å, V=933.8(8) Å^3, and Z=4. All lines were indexed and are consistent with the $P2_12_12_1$ space group.

$2\theta_{obs}$ (deg)	d_{obs}, I_{rel} (Å)	h	k	l	$2\theta_{cal}$ (deg)	d_{cal} (Å)	$\Delta 2\theta$ (deg)	$2\theta_{obs}$ (deg)
8414	10 501	100	2	0	0	8356	10 568	0058
14 909	5937	81	2	1	0	14 859	5957	0050
16 735	5293	1	2	0	1	16 714	5300	0021
17 634	5026	1	3	1	0	17 584	5040	0050
20 875	4252	2	4	1	0	20 823	42 625	0052
22 222	39 972	1	4	0	1	22 200	40 012	0022
22 841	38 902	2	3	1	1	22 831	38 919	0010
24 699	36 016	24	0	2	0	24 668	36 061	0031
25 609	34 757	4	5	0	1	25 582	34 793	0027
26 118	34 091	24	2	2	0	26 089	34 129	0021
27 803	32 062	2	3	2	0	27 769	32 101	0034
28 227	31 589	1	6	1	0	28 170	31 653	0057
30 008	29 754	2	4	2	0	29 976	29 786	0032
31 441	28 430	1	3	2	1	31 438	28 433	0003
32 655	27 401	4	5	2	0	32 613	27 435	0042
33 897	26 424	1	8	0	0	33 902	26 420	−0005
35 646	25 167	2	6	2	0	35 600	25 200	0046
36 162	24 820	2	8	1	0	36 179	24 808	−0017
36 241	24 767	1	5	0	2	36 187	24 803	0054
37 059	24 239	1	8	0	1	37 026	24 260	0033
38 909	23 128	1	6	0	2	38 934	23 114	−0025

The data collected are consistent with the orthorhombic cell parameters a=21.136(4), b=7.212(4) and c=6.126(3) Å, space group $P2_12_12_1$, cell volume =933.8(8) Å^3, and Z=4. These parameters were derived using DICVOL04 (Boultif and Louër, 2004) with the results all being within the errors indicated. The following figures of merits were achieved F_{20}=19.6(0.0192,53) (Smith and Snyder, 1979) and M_{20}=13.6.

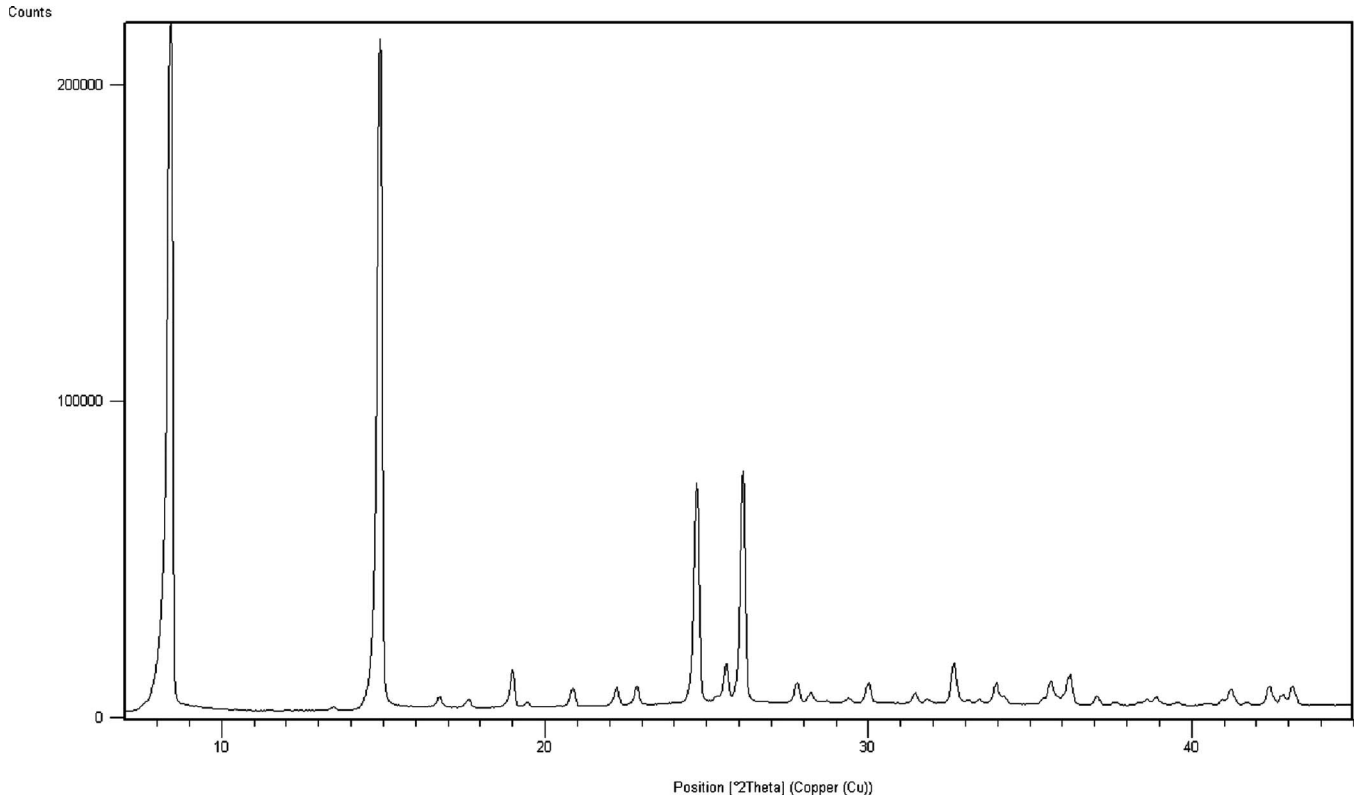

Figure 2. X-ray powder diffraction pattern of alaptide using Cu K_α radiation (λ=1.5418 Å).

ACKNOWLEDGMENTS

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