

Accepted Manuscript

Title: The influence of residual water on the secondary structure and crystallinity of freeze-dried fibrinogen

Author: Verena Wahl Otto Scheibelhofer Ulrich Roessler Stefan Leitgeb Thomas De Beer Johannes Khinast



PII: S0378-5173(15)00104-0
DOI: <http://dx.doi.org/doi:10.1016/j.ijpharm.2015.02.010>
Reference: IJP 14645

To appear in: *International Journal of Pharmaceutics*

Received date: 18-12-2014
Revised date: 3-2-2015
Accepted date: 4-2-2015

Please cite this article as: Wahl, Verena, Scheibelhofer, Otto, Roessler, Ulrich, Leitgeb, Stefan, Beer, Thomas De, Khinast, Johannes, The influence of residual water on the secondary structure and crystallinity of freeze-dried fibrinogen. *International Journal of Pharmaceutics* <http://dx.doi.org/10.1016/j.ijpharm.2015.02.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 The influence of residual water on the secondary structure and 2 crystallinity of freeze-dried fibrinogen

3 Verena Wahl^{a,b}, Otto Scheibelhofer^a, Ulrich Roessl^{a,c}, Stefan Leitgeb^a, Thomas De Beer^d,
4 Johannes Khinast^{a,b*}

5 ^a *Research Center Pharmaceutical Engineering, Graz, Austria*

6 ^b *Institute for Process and Particle Engineering, Graz, University of Technology, Austria*

7 ^c *Institute for Biotechnology and Biochemical Engineering, Graz, University of Technology, Austria*

8 ^d *Laboratory of Pharmaceutical Process Analytical Technology, Ghent University, Belgium*

9

10 Abstract

11 The purpose of this work was to investigate the influence of water content on the secondary
12 structure of a freeze-dried protein (fibrinogen) after a storage period of two weeks. To that
13 end, Attenuated Reflectance Fourier Transformed Infrared (ATR-FTIR) and Raman spectra
14 were generated and evaluated and the crystalline state of the fibrinogen bulks was
15 determined via X-ray diffraction. First, a PCA (principal component analysis) of the spectral
16 data was performed. While the α -helix and β -turn contents were increasing with the
17 increasing water content, the β -sheet content was decreasing. A partial least squares (PLS)
18 model was developed to correlate the mid-infrared and Raman spectral changes with the
19 degree of crystallinity. The obtained R^2 value of 0.953 confirmed a correlation between
20 changes in the secondary structure and crystallinity of the samples. The results
21 demonstrated that the combined ATR-FTIR and Raman approach could be used to predict
22 the crystalline state in freeze-dried fibrinogen products.

23 **Keywords:** solid-state protein; secondary structure; ATR-FTIR spectroscopy; Raman
24 spectroscopy; relative crystallinity; PLS

25 ***Corresponding author.** Institute for Process and Particle Engineering; University of
26 Technology Graz, Inffeldgasse 13, A - 8010 Graz, Austria, Tel.: +43 316 30400, Fax.: +43 (0)
27 316 /873-30402

28

29 E-mail address: khinast@tugraz.at

30

Download English Version:

<https://daneshyari.com/en/article/5818750>

Download Persian Version:

<https://daneshyari.com/article/5818750>

[Daneshyari.com](https://daneshyari.com)