

Review of Doctoral Thesis

Utilization of whey fermentation products for antimicrobial modification of biodegradable polymers

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Study programme: P2808/Chemistry and materials technology

Study course: 2808V006/ Technology of Macromolecular Compounds

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Candidate is author/co-author of 7 scientific papers in impacted journals and many conference contributions. Presented thesis is based on three selected papers related to the thesis topic.

Introduction part provides deep insight in the topic of biodegradable polymers (chapter 1.1). Special attention is paid to the lactic acid. Lactic acid's enantiomers are usually classified by Fischer nomenclature like L(+) and D(-). But nomenclature based on *R* and *S* classification is presumed more general than L and D although L and D classification of lactic acid enantiomers is widely used.

- 1) Could you try to name enantiomers of lactic acid using *R*, *S* nomenclature?

On the page 13 is written following statement... "Depending on the enantiomer's composition and thermal history, PLA can be amorphous or semi-crystalline in its solid state. Generally, when the D-isomer is present at less than about 6%, the PLA is semi-crystalline. On the other hand, if the D-isomer content is >6%, then the polymer can be considered as amorphous".

- 2) What about the crystallinity of opposite composition, when less than 6 % of L isomer will be present in the racemic mixture?

Chapter 1.2 has a peculiar structure and is a bit confusing for a reader: a) deep insights into the composition and fermentation products of whey are provided. b) In the page 19 suddenly the properties and basic characterization of lactic acid appeared. c) Following description is related to the general introduction related to the bacteriocines, which continues by a chapter 1.3 related to the specific bacteriocin nisin.

- 3) On the page 19, first paragraph the term "Asymmetric optical activity" is used. I presume this term as incorrect. Could you explain this issue, please?

Page 26. Antimicrobial activity and stability of nisin – missing sub-chapter number. Although this remark is minor, it is related to the whole introduction part, where the numbering of chapters and sub-chapter is partly confusing.

Contrary to the mentioned minor remarks is the introduction part well written and offers to a reader good overview related to the studied topic. Introduction part is highly valuable scientific text. In my opinion, all facts mentioned in the introduction part are well supported by appropriate references.

The Aims of the thesis are clearly defined in page 37.

Following part is based on attached papers

I have no remarks to the experimental part except of chapters and sub-chapters numbering.

On the page 50 begins the results and discussion part. This part begins with the list of published work which serves as the basis for mentioned chapter. I have no remarks to the facts which already underwent a review process in appropriate journals. Discussion is well extended and results are nicely presented. Work is well supported by appropriate references.

On the page 89 contributions to science and practice is presented. The summary is well written and the importance of the work is fully explained.

Thesis ends with 213 references. I found minor inconsistencies in the format of the references related mainly to "DOI" presentation.

In summary, reviewed Doctoral Thesis written by Ing Pavlína Holčápková "*Utilization of whey fermentation products for antimicrobial modification of biodegradable polymers*" represents remarkably above average level Doctoral Thesis in selected field of research. Consequently, I highly recommend to **award Ing. Holčápková by a Ph.D. scientific degree.**

in Prague 14.11. 2018

RNDr. Jiří Zedník, Ph.D.

