

# ABSTRACT

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**Title of the diploma thesis:** Method development for UHPSFC-PDA-MS analysis of ginsenosides in dietary supplements

The aim of this diploma thesis was to develop an analytical method for the analysis of ginsenosides, the main active compounds of *Panax ginseng*, in dietary supplements. Measurements were carried out with ultra-high performance supercritical fluid chromatography (UHPSFC) system Acquity UPC<sup>2</sup> coupled with photodiode array (PDA) and mass spectrometry (MS) detection.

The first step was the column screening using 11 stationary phases in combination with a CO<sub>2</sub>-based mobile phase and 4 organic modifiers: MeOH, MeOH/ACN (1:1), MeOH + 10 mM NH<sub>3</sub>, MeOH + 2 % H<sub>2</sub>O. The method optimization was carried out on 4 stationary phases with the best selectivity and peak resolution during the screening. This optimization involved changes in the composition of the mobile phase, gradient elution settings, back pressure regulator pressure, and column temperature. Finally, the effect of make-up solvents was evaluated.

The final UHPSFC-PDA-MS method used Torus 2-PIC column, gradient elution and CO<sub>2</sub> + MeOH/ACN (2:1) + 5 % H<sub>2</sub>O mobile phase. The make-up solvent used was MeOH + 10 mM NH<sub>3</sub>. The elution and separation of all 12 analyzed ginsenosides was achieved except for the isomeric critical pair R<sub>c</sub> + R<sub>b2</sub> which was separated with a slightly lower resolution of 1.07.

Eight dietary supplements containing Korean ginseng (*Panax ginseng*) and Siberian ginseng (*Eleutherococcus senticosus*), in both liquid and solid form, were analyzed using the final method. The solid samples were extracted using an ultrasonic bath and filtrated through a 0.22 μm PTFE filter. The effects of 3 extraction solvents were tested as a part of

the optimization of sample preparation. The best extraction results were achieved using MeOH.

The results of the dietary supplements analysis confirmed the presence of ginsenosides in all 6 supplements containing Korean ginseng and the absence of ginsenosides in 2 supplements containing only Siberian ginseng.

**Key words:** UHPSFC-PDA-MS, method development, optimization, dietary supplements, ginsenosides, Panax ginseng