

Summary of Ph.D. Thesis

Simple Experiments with Naturally Occurring Materials in Chemistry Education: Support of Empirical Method and Development of Related Competences

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The doctoral thesis is focused on the problem of gaining empirical knowledge in chemistry education, on the acquirement of related competences, and on the activities which would contribute to the improvements in chemistry education in this area.

The aims set in the first part of the thesis were fulfilled. I have confirmed the insufficient level of the competences acquirement among the Czech students, such as formulation and verification of a hypothesis, planning and carrying out a simple experiment, interpretation of collected data or drawing conclusions. Main cause of this problem could be insufficient opportunity to develop these competences in school chemistry (or science) education at ground and high school level. Experimental activities of individual students are rare in Czech chemistry lessons. The teachers quote that the main problem responsible for this situation is missing equipment for practical activities in their schools and absence of suitable school experiments reflecting the given safety directives.

Considering these findings, I have created a set of simple chemistry experiments utilizing natural products and substances. The experiments are suitable for the individual work of students and for chemistry education even at schools without a laboratory or special science classroom. Chemistry teachers, participants of the further training workshops, appreciate the experiments as very motivating and beneficial for their work at school.

I have selected some simple experiments with naturally occurring materials as a base for the e-learning chemistry course Biochemistry – Natural substances. The aim of the course is to stimulate and further develop the talented high-school students from Czech and Slovak Republic in the natural sciences. The results of the first year of the course showed the motivating effect of the home chemistry experiments and their applicability for this type of education as a starting point for following problems and heuristic tasks. The course was also modified according to the student comments and the experience of instructors.