FKKT | UNIVERZA V LJUBLJANI
Fakulteta za kemijo in kemijsko tehnologijo

VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI / INVITATION TO THE
LECTURE WITHIN DOCTORAL PROGRAMME IN
CHEMICAL SCIENCES

Prof. Dr. Pavel Šiler

Brno University of Technology,
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z naslovom / title:

Effect of zinc on the properties of portland cement

v sredo, 14. 1. 2026 ob 15. uri
v predavalnici 1 v 1. nadstropju Fakultete za kemijo in kemijsko tehnologijo, Večna pot 113 ***/***
on Wednesday, 14. 1. 2026 at 15.00
in lecture room 1, 1st floor at the Faculty of Chemistry and Chemical Technology, Večna pot 113

Vljudno vabljeni! / Kindly invited!

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Abstract:

Cement is the most important binder in the construction industry. It is produced worldwide in large quantities. Due to increasing use of secondary products containing zinc,the amount of zinc in the clinker or in the secondary raw materials is increasing in recent years. Portland clinker can gain zinc from solid waste or tires which are widely used as a fuel for a burning in rotary kiln. In, secondary raw materials like slag, which are commonly added to cement, zinc may be present in the primary material, where the manufacturing process leads to its removal and concentrating to "waste" which is used in the cement industry.

This presentation first introduces the listener to the issue of cement hydration, its course, and the way it is influenced by the presence of zinc. The presence of zinc leads to a change in the reaction environment and to the formation of different hydration products [1]. This results primarily in a negative effect in the form of a significant delay in hydration. When 1% of zinc in the form of ZnO is present, the main peak on the calorimetric curve is delayed to as much as 180 hours [2, 3, 4]. Such cement cannot be used for any practical applications.

A suitable solution to reduce the hydration time of zinc-doped cement is use of various accelerators to eliminate this negative effect [5,6]. By using suitable accelerators, especially those based on formic acid and its salts, it is possible to significantly accelerate hydration in the presence of zinc. The course of hydration and the formation of new products can be monitored primarily by thermal analysis methods [7]. By shortening the hydration time, it is possible to obtain a suitable material exhibits improved mechanical properties and is particularly suitable for the production of prefabricated products, such as ballistic composites.

The next part focuses on the sustainability of cement production, where considerable attention is being paid to increasing the use of clay-based materials, especially calcined clays. Due to the need to utilize these materials, the EN 196-12 standard was introduced recently (December 2024), allowing their use in larger amounts. This makes it possible to obtain materials with properties comparable to those of currently used cement, while reducing the economic and environmental demands of production.

The final part deals with modifications of clay materials for various types of applications [8,9, 10].

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