

Nazwa w jęz. angielskim: Mass crystallization

Dane dotyczące zajęć:  
Information on course:

Jednostka oferująca: Wydział Chemiczny // dr hab. inż. Krzysztof Piotrowski, prof. PŚ  
Course offered by: Faculty of Chemistry // dr hab. inż. Krzysztof Piotrowski, prof. PŚ

<b>Język wykładowy:</b>
angielski
<b>Language:</b>
English
<b>Strona WWW: Course homepage:</b>
<b>Skrócony opis:</b>
<b>Short description:</b>
Providing the Students with theoretical background of mass crystallization from solutions, constructions of industrial crystallizers and mathematical methods for this unit operation modeling.
<b>Opis:</b>
<b>Description:</b>
Fundamentals of mass crystallization from solution. Mass crystallization as a unit operation. Definition of crystal size and shape. Solubility and supersaturation. Nucleation phenomena – their mechanisms and possible sources of nuclei in industrial crystallizers. Primary nucleation – homogeneous and heterogeneous. Origin of secondary nuclei. Crystal growth – mass transport through the film, surface integration processes and their kinetics. Size-dependent crystal growth. Growth rate dispersion. Crystal growth rate expressions. Mathematical modeling of the crystallizing systems. Population balance concept. General population balance equation. Moments of the crystal size distribution. Average crystal sizes. Coefficient of variation – CV. The MSMPR crystallizer model – concept of an idealized configuration. Population balance for MSMPR configuration. Population density distribution function – for size independent and sizedependent growth kinetics. Deviations from MSMPR crystallizer configuration: internal classification of solids, external classification, attrition, agglomeration. Derivation of pure mass crystallization kinetics. Derivation of mass crystallization kinetics from the distributions affected by population events. Physical transport phenomena in mass crystallization – influence of hydrodynamics on the system performance and crystal product quality. Sampling and analyzing the crystallizing systems. Crystallizer design (batch and continuous). Reaction–crystallization (precipitation) systems – their design and practical application.
<b>Contact hours:</b> <b>Lecture 30 h,</b> <b>Number of ECTS credits: 2</b>
<b>Literatura:</b>
<b>Bibliography:</b>
1. Jančić S.J., Grootcholten P.A.M., Industrial Crystallization, Delft University Press, D. Reidel Publishing Company (1984). 2. Nývlt J., Industrial Crystallization – the Present State of the Art. Verlag Chemie, Weinheim – New York (1978). 3. Nývlt J., Söhnel O., Matuchová M., Broul M., The Kinetics of Industrial Crystallization. Elsevier, Amsterdam– Oxford–New York–Tokyo (1985). 4. Current scientific literature from ELSEVIER and SPRINGER databases, CD materials from Industrial Crystallization conference.
<b>Efekty uczenia się:</b>

**Learning outcomes:**

Knowledge: a student knows and understands

K2A\_W08 Student knows modern methods of testing the structure and properties of materials, necessary to characterize raw materials and products of the chemical and related industries; knows the rules of organization of the chemical products market (REACH).

Skills: a student can

K2A\_U03 Student is able to speak English fluently.

K2A\_U01 Student has the ability to acquire and critically evaluate information from literature, databases and other sources and to form opinions and reports on this basis.

K2A\_U06 Student has the ability to present research results in the form of a report, dissertation or presentation.

Social competences: a student is prepared to

K2A\_K06 Student is aware of the need for lifelong learning and professional development

**Metody i kryteria oceniania:****Assessment methods and assessment criteria:**

The final grade is the arithmetic average of the laboratory grades. Lectures are substantive preparation for laboratory classes, therefore this knowledge is verified at the stage of the laboratory test.

**Przynależność do grup przedmiotów w cyklach:****Element of course groups in various terms:**

Opis grupy przedmiotów Course group description	Cykl pocz. First term	Cykl kon. Last term
przedmioty obieralne studia stacjonarne i niestacjonarne stopień studiów – dowolny kierunek studiów – dowolny, semestr dowolny  elective courses full-time and part-time studies degree - any field of study - any semester - any	2023/2024	