

ChE-402

Advanced diffusional processes

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Cursus	Sem.	Type
Ing.-chim.	MA1, MA3	Obl.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	3 weekly
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This course aims to provide an in-depth understanding of diffusion and mass transfer, that is an essential tool for the chemical engineers.

Content

1. Fundamentals of diffusion
2. Diffusion in dilute solutions
3. Diffusion in concentrated solutions
4. Diffusion coefficients in gases, liquids and solids
5. Diffusion of interacting species
6. Multicomponent diffusion
7. Dispersion
8. Fundamental of mass transfer
9. Theories and empirical correlations in mass transfer
10. Diffusion with chemical reaction

Keywords

Diffusion, mass transfer, convection, dispersion, multicomponent diffusion

Learning Prerequisites**Important concepts to start the course**

Mass, and energy balance
Basics of diffusion and mass transfer

Learning Outcomes

By the end of the course, the student must be able to:

- Carry out Calculations to extract concentration profile for a given system
- Carry out Calculations to extract mass transfer rate for a given system

Teaching methods

- Blackboard and projector slides would be used to deliver the course content. Examples and exercise will be conducted in between the lecture.

- Clickers (device that allows you to answer interactive questions in class) would be used to conduct quizzes (usually multiple choice questions). These quizzes are meant to support the learning process. For example, clicker based question would be asked at the start of every class to gauge understanding of the subject and review concepts. Clicker responses would be anonymous. Answers will not be used for formal assessment. To be able to participate in this, you can use your smartphone/tablet to answer questions. You will have to install the 'TurningPoint' app on your smartphone (Android or iOS). You can find the details here:

<https://play.google.com/store/apps/details?id=com.turningTech.Responseware&hl=en-ca>

<https://itunes.apple.com/us/app/turningpoint/id300028504?mt=8>

- For students who do not have smartphone or prefer not to use their smartphone, they can pick EPFL clickers in the first class. Students are responsible to bring them to every lecture. Student borrowing the clickers must return them in the last class of the semester. Students are responsible for getting assistance in case of technical issues (for example, low battery). Clickers can also be borrowed from the library. To borrow a clicker, visit the Library main counter at the Rolex Learning center (Mon-Fri, 8 AM to 8 PM). The loan is free of charge and the only thing you need is your CAMIPRO.

Expected student activities

Lecture and exercise (3 hr per week). The exercise will be solved during the lecture. Students are expected to solve 1-2 assignment problems every week.

Assessment methods

written exam (mid term and final exam)
Assignments after every lecture, which will be graded.

Resources

Bibliography

Diffusion: mass transfer in fluid systems 3rd ed.