Hanze

Course: Process Technology 2 credits: 5

Course code	CTVP23PROCES2
Name	Process Technology 2
Study year	2023-2024
ECTS credits	5
Language	Dutch, with parts in English
Coordinator	R.A. Knigge
Modes of delivery	Lecture Practical / Training Tutorial
Assessments	Practicum - Other assessment Theorie - Written, organised by STAD examinations

Learning outcomes

The Process Technology 2 curriculum component covers the following components of the Chemical Engineering BOKS:

Knowledge:

Thermodynamics: chemical thermodynamics (equilibria, enthalpy)

Statistics and mathematics: differential equations (numerical solving), data processing and data analysis (non-linear regression)

Process modelling: simulating and modelling reaction mechanisms and growth curves

Reactor science: kinetics (reaction mechanisms, catalysis, enzyme kinetics)

Materials science: material properties (plastics)

Chemistry: chemical equilibrium, basic polymer chemistry, basic biochemistry

Skills:

ICT skills: use and deployment of state-of-the-art digital tools/software (Excel, Mathcad, Minitab)

Social and communication skills: reporting and presenting

General laboratory skills and chemical analysis methods: laboratory-scale experimentation

Working safely in laboratory and industrial environments

This module has the following learning outcomes:

You describe the growth of microorganisms (prokaryotes) using the Gompertz equation and logistic growth.

You describe the location and shift of chemical equilibria based on calculated values of Kc and Kp and on the Chantelier-Van t'Hoff principle.

You calculate the reaction enthalpy of a reaction based on formation enthalpies of the substances in the reaction equation.

You communicate in writing according to the given guidelines (logbook instruction, template report, poster instruction) in Dutch about a simple(er) experiment/professional task.

You execute in a safe way an experiment in a chemical laboratory

Content

The basis of many chemical-technological processes is the chemical reaction. This module focuses on chemical equilibrium (Kc, Kp), reaction enthalpy, and reaction rate (kinetics). Kinetics are discussed for simple reactions, also for sequential reactions (polymers) and, in the case of low temperature, the use of a catalyst.

An introduction to biochemistry is also covered (DNA, RNA, fats, sugar, proteins, ADP/ATP) with the connection of catalysts in bacteria in the form of enzymes. Growth of bacteria/yeasts (Gompertz, logistic) is covered along with fitting growth data to models (Minitab) and calculating growth models (ODEs with Mathcad). Reaction kinetics using enzymes (Michaelis-Menten) is discussed.

and write a reflection on the obtained results.

You reflect on your functioning and professional development.

DAS competencies

Competency	Level (I-IV)
Research	1
Experimentation	1
Development	1
Management	
Advise	1
Instruction	1
Leadership	
Self-management	1

Included in programme(s)

Chemical Engineering

School(s)

Institute for Life Science & Technology

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