INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Chemical reaction engineering

Introducing

Description

Mass balance in reactional homogeneous systems. Continuous and batch systems. Transient and steady states. Progress reaction parameters and global balances. Reaction rate, law for reaction rates and temperature influence. Identification of reaction rate laws. Pseudo-first order approximation. Ideal reactors (batch, continuous stirred and plug flow). Mass balances application in ideal reactors. Isothermal reactors design.

Objectives

At the end of this module, the student will know and be able to explain (main concepts):

- kinetics of a chemical, or biochemical reaction
- Rate-limiting step, catalysis, inhibition
- Reaction rates, kinetic order and constant, activation energy
- Reaction progress parameters
- Mass balances applied to reactors
- Continuous and batch stirred reactors
- Plug flow reactors

The student will be able to:

- define a system, its boundaries, for a defined purpose; calculate all the molar fluxes (inlet, outlet, transformation, variation);
- choose the best ideal reactor for a homogeneous isothermal chemical reaction in liquid phase and calculate it (reactor design)
- write mass balances by using reaction progress parameters
- establish a kinetic law from reaction mechanisms in the case of simple chemical and enzymatic reactions. Understand how physiological aspects can impact the kinetics of microbiological reactions.
- propose experimental and numerical methods for determining the kinetic law for a homogeneous reaction from experimental data.
- determine a kinetic constant for a given temperature (Arrhenius law)
- treat a general homogeneous isothermal problem of chemical reaction engineering

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse