

Challenges of modern chemistry

In brief

➤ **Course language:** French

Presentation

Prerequisites

Fundamentals of organic and organometallic chemistry.

Learning objectives

The growing interest for a more responsible chemical industry leads to the development of a chemistry commonly called "green chemistry".

In this course, we will focus on the 9th principle of green chemistry: catalysis and, in particular, homogeneous catalysis.

This theme will be addressed through an original approach of the chemical reaction.

The aim is to understand how a catalyzed reaction works in order to optimize it efficiently in a spirit of sustainable development.

Learning objectives:

- Understand how a catalyst works and its corollary, the catalyzed reaction..
 - Identify the key parameters of a catalyzed reaction.
 - Know how to optimize the parameters
 - Implement a catalyzed reaction
 - Write a scientific report
-

Description of the programme

Course content:

- Introduction to organometallic chemistry (transition element chemistry).
- The basic steps of a catalytic reaction,

- Analysis and optimization of the parameters of a catalyzed reaction.
- Oxidations and reductions catalyzed by transition metals

In tutorials: studies of recent publications.

Practical work: implementation of catalyzed reactions.

Generic central skills and knowledge targeted in the discipline

At the end of this course, in the field of transition metal catalyzed reactions, the participant should be able to:

- Analyze a mechanism in terms of elementary steps.
- Propose a reaction mechanism from the global scheme of the reaction.
- Implement a catalyzed reaction in a practical way.
- Study and understand a scientific article.
- Identify the important parameters of a reaction.
- Propose optimization solutions.
- Write a scientific report.

How knowledge is tested

- A report on a recent original synthesis study.
- Reports of practical work.
- A final exam.

Bibliography

- Crabtree, R. H. (2019). *The Organometallic Chemistry of the Transition Metals* (7e éd.). Wiley.
- Behr, A., & Vorholt, A. J. (2017). *Homogeneous Catalysis with Renewables*. Springer.
- Sheldon, R. A., Arends, I., & Hanefeld, U. (2007). *Green Chemistry and Catalysis* (1re éd.). Wiley-VCH.

Teaching team

Laurent GIORDANO
Didier NUEL

Sustainable Development Goal



Responsible consumption and production

Total des heures

CM	Master class	6h
TD	Directed work	12h
TP	Practical work	12h

30h

Useful info

Name responsible for EU

Lead Instructor

Didier Nuel

✉ didier.nuel@centrale-med.fr