

# 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

## Useful info

---

Name responsible for EU

**Lead Instructor**

Didier Nuel

✉ [didier.nuel@centrale-med.fr](mailto:didier.nuel@centrale-med.fr)