

Chemical Engineering Practical Work ChE-309

Course Guide, Spring 2025

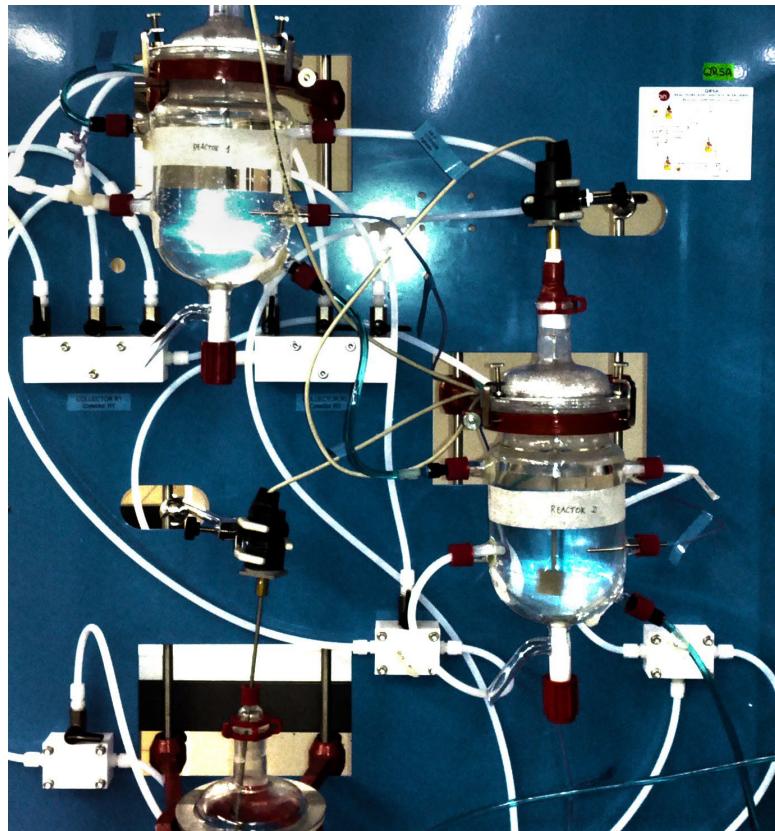


Photo: Continuous stirred tank reactors in the QRSA system

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1. Safety and standard operations

Safety in industrial, research, and teaching laboratories is the most important aspect. Beyond regulatory obligations, we would like to stress a much more positive, and therefore much more motivating aspect. In the most innovative companies, the Health and Safety department is more and more often attached to the Quality department. These companies have indeed realized that Safety is one of the dimensions of "Total Quality" and a factor of productivity. What these companies have understood is that it would be abnormal that laboratories (places of excellence by vocation) do not adhere to it. Security is not a set of annoying constraints that are externally applied to a protocol that would work just as well (or even better) without them: it is one of the dimensions of the protocol and must therefore be integrated into the design of the protocol. Security has two dimensions. One concerns the infrastructure and equipment of the laboratory. This is the responsibility, in their respective responsibilities, of the Establishment Management and the Laboratory Management. The other concerns the responsibility of everyone in the daily work. It is essential to work safely both to protect oneself from the risks inherent in one's activity and to protect those who work with us. In the brochure of the Faculty of Basic Sciences <https://www.epfl.ch/campus/security-safety/activites-en-labo/dangers/>) you can find some simple instructions and rules to be applied in research laboratories. In the interest of your safety, please read them carefully. If you have any questions or concerns about safety in the TP lab, please contact the lab director, Professor Wendy Queen (wendy.queen@epfl.ch).

1.1 Conduct and behavior at the practical exercises

You must always behave in a safe and professional manner in the laboratory. Anyone who chooses to behave inappropriately will be asked to leave the laboratory. Some basic rules that must be followed:

- Never work alone or unattended
- Food and smoking/vaping are prohibited in the practice room
- Always clean up your mess and garbage
- Never dispose of hazardous materials down the drain
- Do not bring large bulky items into the TP room. Place your backpacks and other large items in the green lockers in the hallway.

In addition, each student is required to attend each practical session scheduled to obtain a semester grade. As a general rule, each absence must be reported in writing (email) to the Professor. In case of illness, a doctor's note is required to validate the absence, and the missed experiment should be made up (e.g. with another group) - after arranging with the Assistant and with the Professor. A maximum of one absence is tolerated in order to get a grade for the TP. The participation of each student is important during their TP, and a participation grade will be given for each TP. This will be based on your attendance, active participation and understanding of the TPs, as evaluated by discussions with the teacher and assistants during and after the TP. This grade may be different for different members

of each group.

1.2 Clothing

You will find below some rules of dress to be respected in the practice room. Indeed, we attach particular importance to the safety standards to be adopted in a laboratory.

- **Wear safety glasses (at all times in the lab!)**
- **Wear a lab coat (at all times in the lab!)**
- Wear long pants. No shorts, no skirts or dresses!
- Wear suitable shoes (e.g. sneakers) without open toes (no sandals).
- Wear socks
- Tie up long hair

In case of non-compliance with these security rules, the assistant in charge will exclude the student from the TP. In the event of repetition in an offence, no grade will be issued.

2. Experiments/manipulations

The aim of the chemical engineering practical work is to familiarize you with and confront you with concepts as varied as fluid mechanics, mass and heat transfer, material or heat balances, dimensionless quantities, continuous reactors, without forgetting basic physics and chemistry. On the other hand, these practical works will be a support to the theoretical courses you will follow throughout your engineering and chemistry studies. They will allow you to develop a reflection of the theory presented.

You will find below a list of experiences we will operate this semester:

TP No.	Experience	Assistant
TP-1	Continuous chemical reactors	Tejas Deshpande
TP-2	Evaporation	Sanjay Ventkatachalam
TP-3	Crystallization	Arthur Bouchez
TP-4	Fixed and fluidized beds	Wai Kwan Liu
TP-5	Oxygenation of water	Nicolas Diercks
TP-6	Tank level control	Pattaraphon Rodlamul
TP-7	Filtration	Meoli, Matthieu
TP-9	Conduction in stationary and transient states	Charlotte Bardin
Responsible in case of technical problems :		Frédéric GUMY frederic.gumy@epfl.ch / 021 693 78 78

3. Course structure and reporting

3.1 Course Structure

The course will run every Thursday according to the schedule on moodle.epfl.ch. TPs will start at 09:15 in the TP room CH C0 396 and will last until 12:00 (or until the amount of data collected is sufficient to write the report). There are 8 total TPs. For each TP each week a group of two or three students will work on the TP module as scheduled (see schedule on moodle). The schedule has been randomly assembled so each student will work in a different group each week (with some minor repetitions, which are unavoidable). Since there are 8 TPs and 12 weeks, each student will only work 8 weeks and have four (randomly selected) weeks off in addition to the week of Easter and on Ascension, which are EPFL holidays. The protocol for each TP is posted on the course moodle, since the time in the lab is limited, **it is strongly suggested that each student read and understand the theory of the experiment and the objectives of the module before coming to the lab**. The TP assistants will be present to introduce you to the equipment and make sure that you run it safely, but they will not tell you what data you need to acquire to write the report according to the tasks stated in the protocol. It is the students' job to determine what data must be collected. Once the students have collected all of the data they need to write the report, they are free to clean up, finish the experiment and leave the lab. However, after finishing and leaving the lab, students will not be allowed to return for the remainder of the day. For all TP experiments carried out, each group will submit a short written report based on the data acquired and the questions asked in the protocol document. This report must be completed and uploaded to moodle.epfl.ch (.pdf or .doc format) **within one week of performing the TP**. The reports can be **in English or French** according to the preference of the Assistant (ask the TP Assistant to inform you of the preferred language for each report).

3.2 Format of the short report (1 report per group)

The format of this report is consistent with what is done in the industry. It is a memo of 2 - 5 pages maximum, containing precise information to be read quickly. The format is generally as follows:

Summary/Abstract (contains essential information about what has been done and what was found).

Introduction (very concise, containing the goals).

Results and discussions (most important part, please put large amounts of data in an appendix to make this section easy to read)

Conclusions Recommendations (and responses to any design questions posed in the TP protocol)

Appendices (1-3 pages, figures, tables, diagrams, if necessary)

An example of a short report is also available online. Please follow the format exactly including the file name: an_TP_pair.pdf (ex: **2024_TP2_DF.pdf**)

4 Evaluation of the TP

4.1 Overall rating

The TP grade will be divided by your individual tasks:

Participation	10%
9 TP + short report	90% (9 x 10%)

The participation part of the grade will be based on your attendance (see section 1), participation and understanding of the TPs, evaluated by discussions with the teacher and assistants during and after the TP. This score may be different for different members of each group. However, the grade for each report will be the same for each student in the group.

4.2 Scoring of the brief report

- One report per group (Each member of the group receives the same score)
- Figures: Each figure must have a legend with a maximum of details, and must be prepared on the computer.
- Format: Use Times (Times New Roman) 12 point font, 1.5 spacing

Headings	points
Abstract	20
Introduction	10
Results and discussions	40
Conclusions	10
Recommendations	20
Appendices (Note included with results and discussion)	
Total	100

4.4 Note adjustments :

For the reports:

Penalty

Late (# Days late)	- 10%/Day
Plagiarism of figures (# Figures)	- 10%/Fig.
Text plagiarism	- 10%/paragraph