

Introduction to Chemical Engineering Practical Work (ChE-203 TP)

Course Information, *Spring 2025*



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1. Safety and standard operations

Safety in industrial, research and teaching laboratories is the most important aspect to consider. Beyond the 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 if 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 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/>) you can find some simple instructions and rules to be applied in research laboratories. In the interest of your safety, please be familiar with the information given therein. If you have any questions or concerns about safety in the TP lab, please contact the lab director, Professor Raffaella Buonsanti.

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 smoke are prohibited in the practice room
- Always clean up your mess and garbage
- Never dispose of hazardous materials down the drain.
- Participate in the discussions and be active (e.g. playing card games on the phone is not an appropriate behavior. Yes, it happened in the past, so please do not repeat.)

In addition, each student is required to attend each scheduled practical session to obtain a semester grade. As a general rule, each absence must be reported in writing to Prof. Raffaella Buonsanti. In case of illness (a doctor's note is needed), the TP can be made up— after prior agreement with the Professor—with another group or at another time with the additional agreement of the Assistant (a maximum of one absence is tolerated in order to get the grade of TP).

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 long pants. No shorts, no skirts or dresses!
- Wear suitable shoes (e.g. sneakers, not open shoes).
- Wear socks
- Wear safety glasses
- Wear a lab coat

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

2. Experiences

The aim of the chemical engineering practical work is to make you familiar with with concepts as varied as mass and heat transfers, material or heat balances, dimensionless quantities, continuous reactors, without forgetting some notions of fluid mechanics. On the other hand, these practical works will be a support to the theoretical courses you will follow throughout your engineering and chemistry studies. A few of them are related to energy devices, such as fuel cells and solar cells. The TPs will allow you to develop a reflection on the theory presented.

You will find below a list of experiences:

TP No.	Experience	Assistant(s)	Contact
TP-1	Heat exchanger	Riya GUPTA	riya.gupta@epfl.ch
TP-2	Pressure drop	Hugh WARKENTIN	hugh.warkentin@epfl.ch
TP-3	Refrigerator	Pratap SONI	pratap.soni@epfl.ch
TP-4	Photovoltaics	Marco FABBIANO	marco.fabbiano@epfl.ch
TP-5	Chemical reactions	Jennifer CALDERON MORA	jennifer.calderonmora@epfl.ch
TP-6	Fuel cells	Coline BOULANGER	coline.boulanger@epfl.ch
Responsible in case of technical problems:		Frédéric GUMY frederic.gumy@epfl.ch / 3 78 78	
In charge of the course:		Raffaella BUONSANTI raffaella.buonsanti@epfl.ch	

3. Course structure and reports

3.1 Course Structure

Due to the number of students registered for this course, each student will be placed in a group of two to four, depending on the year. The TP period is reserved on Fridays from 9:15am to 12pm and 3:15pm to 6pm in the TP Hall CH C0 396. Each group will participate either in the morning or afternoon session according to the calendar posted online at moodle.epfl.ch. Given the large number of students, some groups will have a break each week as shown on the schedule. For each experiment each group must write a report.

They must be completed and uploaded to moodle.epfl.ch (.pdf or .doc format) within **one week (by 23:59 on the next Friday)**. Please ask the assistant for each experience if he or she prefers you to write your report **in English or French**.

3.2 The report (1 report per group per experiment)

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

Abstract (contains the essential information of what is done and what is found. This section should also include a summary of the data - it should include numbers and not just words).

Introduction (very concise, containing the goals).

Results and discussions (most important part)

Conclusions

Recommendations

References*

Appendix (1-3 pages, figures, tables, data plot, raw data collected during the TP)

Please follow the format exactly including the file name: group _TP (e.g. **A_TP-6.pdf**)

* Statements in the report should be accompanied by references. Books and journal articles are good references. Generally, 7-10 references per report is a good number. Please, be aware of plagiarism, so don't forget to cite your source. For example, you can use ChatGPT if you wish, however you must cite it. Also please note that the information provided are not always correct, thus use it at your own risk. You can read [this article](#) and [this one](#).

3.3 The oral presentation (1 presentation per group for the last TP)

The format of the presentation is consistent with what is done in industry and in academia. **A sample presentation is also available online**. The format is generally as follows:

General introduction of the topic (1 slide on why the TP is relevant, e.g. importance of solar cells)

Introduction of TP (2-5 slides: theoretical background, goals of the TP).

Experimental part (1-slide)

Results and discussions

Conclusions

Recommendations

References

Appendix (anything not essential but that might be needed to address questions)

The group members should all present one part of the presentation and be active in addressing questions afterwards. Reading notes is not appropriate. You must practice and give the presentation looking at

your audience and doing your best to engage it.

4 Evaluation of TP

4.1 Overall marking

The final grade of ChE-203 TP will be divided as follows:

Participation	20%
5 TP + report	60% (5 x 12%)
Oral presentation	20%

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.

4.2 Report Rating

- One report per group
- Figures: Each figure must have a legend with a maximum of details, and must be done on the computer.
- Format: Use Times (Times New Roman) 12

Headings	points
Abstract	15
Introduction	10
Results and discussions	40
Conclusions	10
Recommendations	20
References	5
Appendix (Note included with results and discussion)	
Sum	100

The assistants will provide you timely feedback on the first 3 reports so you can improve for the remaining ones of the course.

4.3 Oral presentation

In general, the presentation should contain:

Headings	points
Introduction of the experiment	10
Experimental part with an installation diagram	15
Results/Discussion/Literature Comparison	30
Conclusion	10
Specific Recommendation	5
Oral expression (style)	20
Visual support (style)	10
Sum	100

4.4 Note adjustments:

For the reports:

Penalty

Late (# Days late) - 10% of the total grade/Day

Plagiarism is not admitted. The entire report will be null if any evidence is found (e.g. text copied by a source which is not properly cited or from reports of other colleagues).

5 EDIBON software and hardware tips

For the TP, we use computer-controlled equipment from the company EDIBON. Each experiment consists of a main unit, an interface module, and a computer.

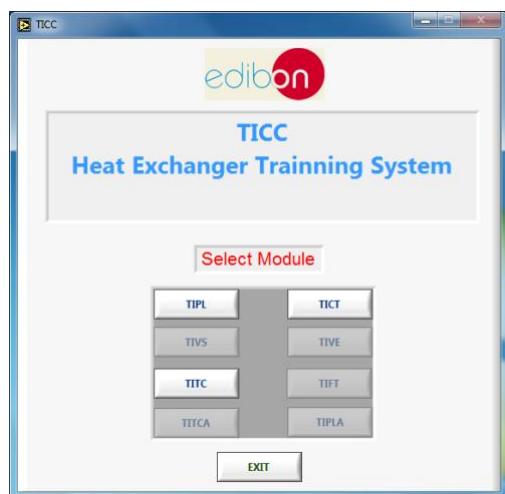


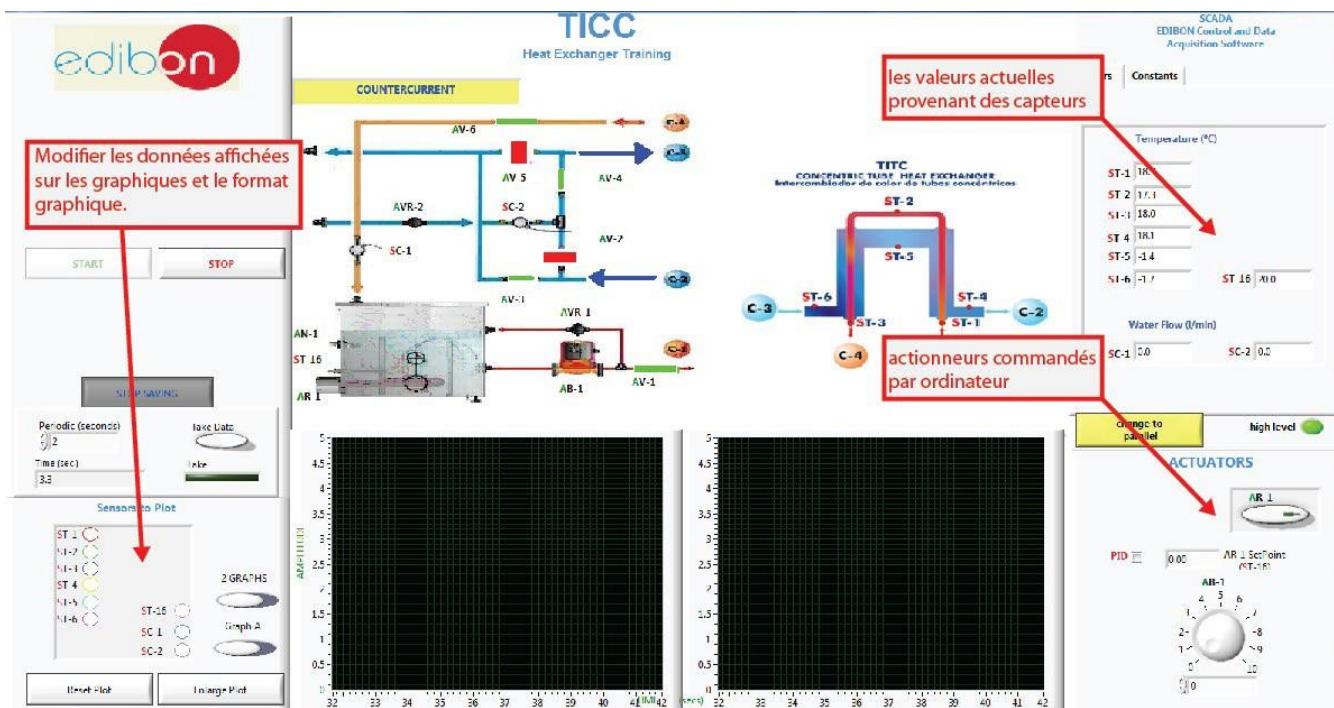
Usually to start the equipment:

- 1) First, turn on the computer interface box (the switch should glow red).
- 2) Login to the "user" account on the computer (no password required).
- 3) Start the labview executable file with the name of the instrument (e.g. CFTC for heat pump) located on the computer desktop.



- 4) Based on the "heat exchanger" experiment, you will have to choose the specific module to be used (TICT).





5) Click on "Start" and you will be asked for a file name to save your data. Please use the format "date" _ "group name" (e.g. 20130420_B4). The data will be stored in a file that can be opened from the shortcut on the desktop. **Important: Your data will only be saved once you start saving your data with the "Save Data" button.**



6) to start saving data: click on the "Save data" button. You can choose how often the data is recorded. The recording is indicated by the LED flashing green. All data is saved even if you do not choose to display the data on the graphs.

7) Your .dat data file (which can be found in the folder on the desktop) can be imported into the data manipulation program of your choice.