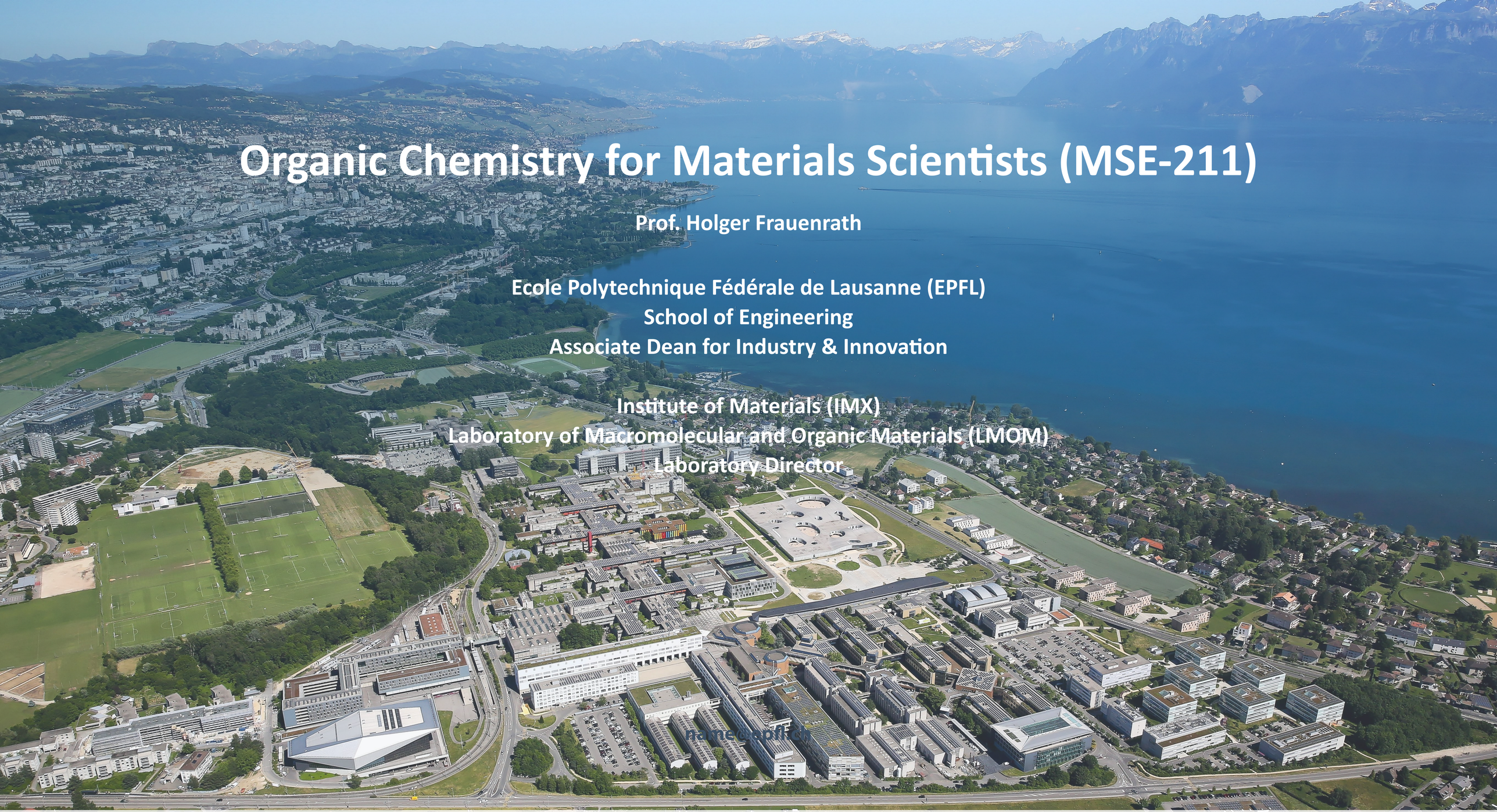

Organic Chemistry for Materials Scientists (MSE-211)

Prof. Holger Frauenrath

Ecole Polytechnique Fédérale de Lausanne (EPFL)
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Associate Dean for Industry & Innovation

Institute of Materials (IMX)
Laboratory of Macromolecular and Organic Materials (LMOM)
Laboratory Director

Table of Contents

Learning Objectives

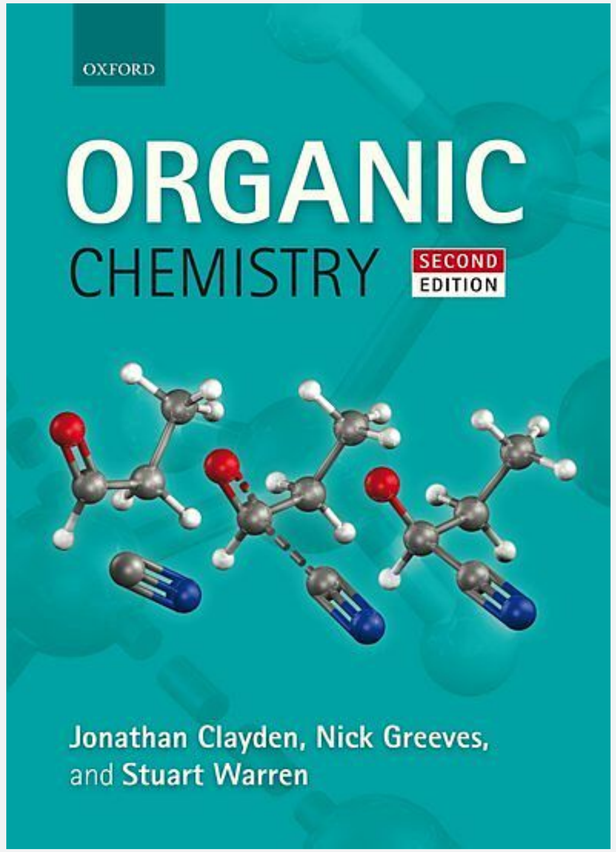
Class & Exercise

- draw and correctly name organic molecules
- comprehend the three-dimensional structure of organic molecules
- understand covalent bond formation and electron delocalization
- know functional groups and understand principles of chemical reactivity
- formulate chemical reactions and understand their outcome
- know classes of organic compounds relevant in materials science

Lab Course

- prepare and run chemical reactions
- stoichiometric calculations
- work-up, product isolation and purification
- basic characterization techniques

Recommended Text Books



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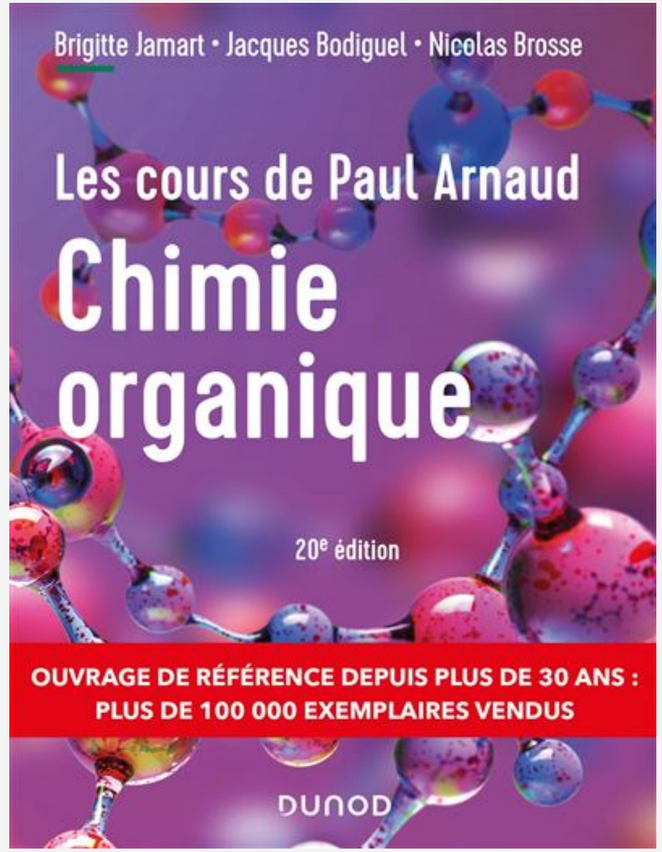

Jamart, Bodiguel, Brosse
Les cours de Paul Arnaud – Chimie organique, Dunod, 19th ed., **2015**.

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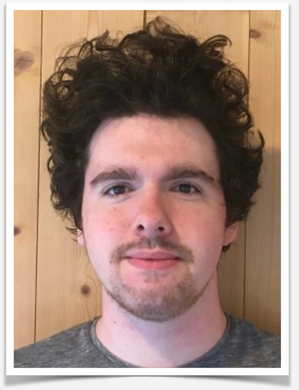

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Joseph Abbott
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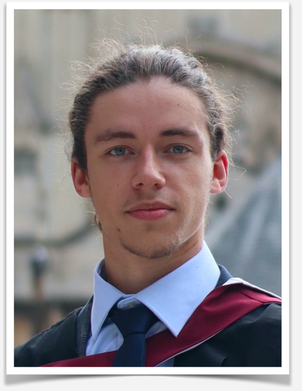


Course Schedule for Students of Group A

Date	11.9	18.9	25.9.	2.10.	9.10.	16.10.	23.10.	30.10.	6.11.	13.11.	20.11.	27.11.	4.12.	11.12.	18.12.
8–9							fall break				Rctn 1	Rctn 2	Rctn 3		
9–10	Announc.	2.3	2.5	3.2	3.2	4.3		4.5	4.6	5.1	A	A	A	5.2	5.3
10–11	1	2.3	2.5	3.2	4.1	4.3		4.5	4.7	5.1	A	A	A	5.2	5.4
11–12	2.1	2.4	3.1	3.2	4.2	4.4		4.5	4.8	5.1	A	A	A	5.3	5.4
12–13	(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)		(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)	(Ana III)
13–14															
14–15	2.2	2.5	3.1	(ES1)	(ES2)	(ES3)		(ES4)	(ES5)	(ES6)	Recryst.	MS	NMR	(ES7–8)	(ES9–10)
15–16	2.2	2.5	3.1						Safety		A	A	A	(ES7–8)	(ES9–10)
16–17									Safety		A	A	A		
17–18			(ES1)	(ES2)	(ES3)	(ES4)		(ES5)	(ES6)	(ES7)	(ES8)	(ES9)	(ES10)		

In-person class | exercise session | laboratory (UNIL)

Exercise Sheets

- **goal of the exercises is to encourage you to work on the course continuously**
  - the exercises also serve to prepare you for the exam questions
  - the style of the exam will follow closely the exercise
  - we do not want to control or punish you
- **exercise hours are voluntary, your chance to talk to the teaching assistants**
  - we will distribute exercise sheets (almost) every week of the course (overall 10)
  - you solve them at home or during the exercise hours, even with the help of the assistants
  - you return the exercise sheets at the indicated dates
  - we correct them and give detailed feedback if you want
  - we do not give actual grades for individual exercise sheets!
  - if ≥60% of the questions are treated in a reasonable way, a sheet counts as “passed”
  - exercise grade 6.0 for 10 sheets, 5.75 for 9 sheets, 5.5 for 8 sheets, 5.25 for 6 sheets, …
- **total course grade is 75% exam, 15% exercises, 10% lab course & reports**

Lab Course

- **the class will be complemented with a lab course on November 20, November 27, and December 4**

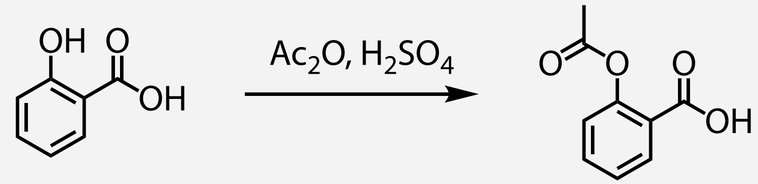
- **each one of you will be performing chemical syntheses at the UNIL Chemistry Teaching labs in the UNIL Amphipol building**
  - POL-452 (https://planete.unil.ch/plan/?local=POL-452)
  - POL-456 (https://planete.unil.ch/plan/?local=POL-456)
  - POL-462 (https://planete.unil.ch/plan/?local=POL-462)

- **the lab course is a full-day course, from 8 am to 5 pm (with a break for lunch and Analysis III). You absolutely need to be at the UNIL Chemistry Teaching labs at 8 am sharp (!) on lab course days.**

- **you will have to follow a short safety course and perform a short safety exam on November 6, in order to be allowed to participate in the lab course.**

Lab Course Overview

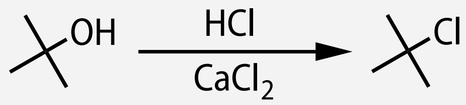
- synthesis of Aspirin



corrosive

- synthesis of *tert.*-butyl chloride

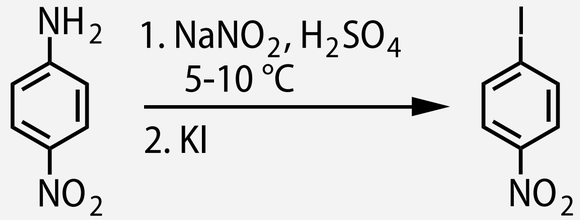
corrosive



flammable flammable

- Sandmeyer reaction

corrosive



toxic, carcinogenic

- **safe handling of toxic, corrosive, harmful chemicals is part of this lab course!**

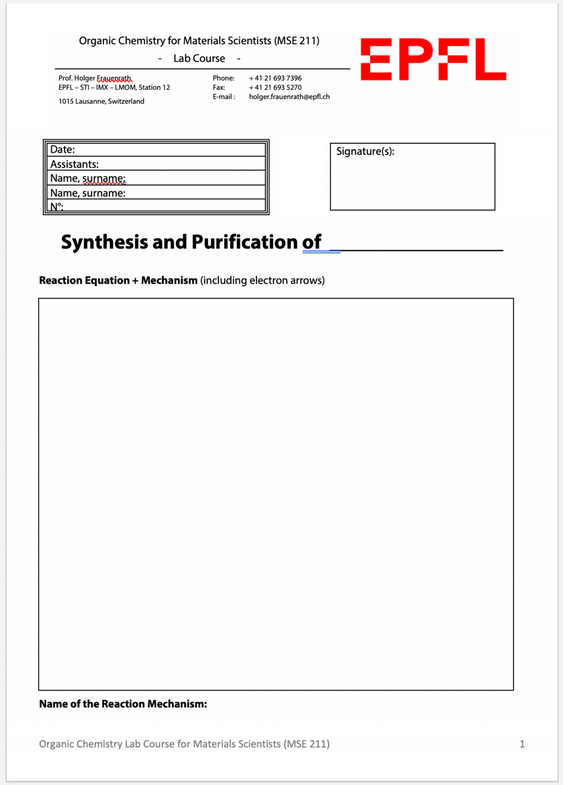
Lab Coats and Safety Glasses

- **lab coats, safety glasses, and masks must be worn at any time!**

- **lab coats will be sold at the first day of the lab course for 35 CHF**
- **please fill out the Google form: https://forms.gle/3EQEPSskhWjk8ARw8**
- **glasses will be sponsored by the Section de Materiaux**
- **masks will be provided (4 per person)**

Protocol Preparation

- we will make available the documentation for the three reactions
- the first two pages of the protocol must be filled for the lab course day!



Organic Chemistry for Materials Scientists (MSE 211)
- Lab Course -

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Fax: + 41 21 693 5270
E-mail : holger.frauenrath@epfl.ch

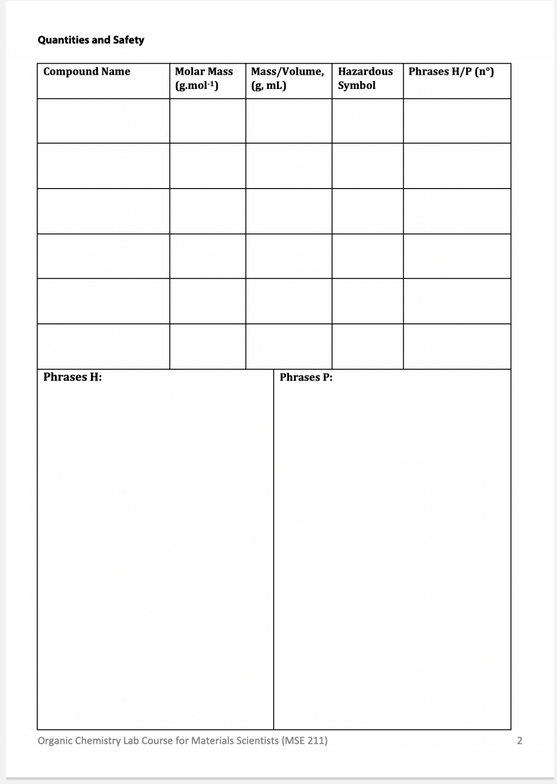
Date:
Assistants:
Name, surname:
Name, surname:
N°:

Signature(s):

Synthesis and Purification of _____

Reaction Equation + Mechanism (including electron arrows)

Name of the Reaction Mechanism:



Quantities and Safety

Compound Name	Molar Mass ($g.mol^{-1}$)	Mass/Volume, (g, mL)	Hazardous Symbol	Phrases H/P (n°)

Phrases H:	Phrases P:

- a video on protocol writing will be available at the Moodle site by 4.11.21

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