

Safety Rules to use Wet-Benches of CMI





Introduction

Chemicals of various degrees of danger are used daily in the clean room. It is in the interest of everyone to decrease the accident risks. This requires a personal effort of all the users in three points:

- I To know all dangers and hazards of chemicals used
- II To know how to handle these products in the good way
- III To protect yourself with the good manner

Hazards are easily forgotten and bad things happen. And this not only concerns you, but also people who are working near you.

For these reasons, CMI imposes strict rules to use all the chemical wet-benches available in the clean-room.

READ CAREFULLY THIS DOCUMENT!

Before operating, everyone must be able to answer these questions:

- What are the main hazards linked to the equipment / chemicals I use?
- What are the safety rules related to my activity?
- What must I wear as personal protective equipment?
- Where are the eye-wash and safety showers?
- Where are the emergency phone numbers posted?
- How and who to call for help?
- Where are the extinguishing equipment and the emergency exits?



Take Care when making mix of chemicals :

- ! **Acid + Base = BOOM** : mix strong acid with base creates an exothermic reaction that could lead to an **explosion ! Never do that !**
- ! **Never put back a chemical in its original bottle ! Used chemicals must be put in appropriate dedicated waste!**
- ! **It is strictly forbidden to mix :**
 - ▶ **Chemicals mixture which has not been accepted by CMI staff “on the paper”. Standard Operation Procedure (SOP) must be reviewed and accepted.**
 - ▶ **Oxidizing acids**
 - ▶ **Sulfuric acid**

Never forget...

- ! **Protective goggles** must be worn during all the time your are working in the clean-room.
- ! It is misadvised to wear contact lenses in the clean-room. This because it could absorb vapours of chemicals !
- ! For safety reasons, it is forbidden to use headset to listen music. Cell phones are not allowed too.
- ! Chewing-gums are not tolerated in clean-room
- ! **Dry sulphuric acid on a clean-room paper put in the trash can ignite and cause severe damages !**

- ! **When you see droplets of liquid on the wet-bench, don't assume it is water. Check first with pH papers if it's acidic or not !**



Instructions

Prepare your work on the wet-bench :

1. **Check** that the bench you are going to use is clean, dry and free of useless equipment. If it is not the case, contact the person who used the wet-bench before you and ask to clean.
2. **Login** on zone computer.
3. Put on single-use white nitrile gloves on top of standard cleanroom gloves.
4. **Load your wafers in the Teflon carrier** (white) with the wafers you want to process. NEVER place neither the antistatic black box nor the black carrier on the bench ! It is also forbidden to place the Teflon white carriers elsewhere than on the wet-bench !
5. **Bring the chemicals near the bench** to prepare the bath : **do not place bottle on the floor !** For this reason, you bring the bottles one by one from the cupboard to the bench. If you have several bottles to bring, a Teflon kart is available in the room where chemicals are stocked.



Safety rules to use Wet-Benches of CMI



Protect yourself before to work :

1. **Full protection** required to handle chemicals on the wet-bench:

At first, we highly recommend to put on single-use white nitrile gloves on top of standard cleanroom gloves.

- a) **Apron** : Like described on the following pictures, pull the two strings to adjust and cover a large area of your body. The node should be made on a side.



- b) **Facial Mask** : Adjust with the size of your head so that it fits correctly. You can remove the goggles and put them on a shelf nearby.





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- c) **Chemical gloves:** Put gloves (and also remove) without touching the white part; rinsing the outside of the gloves before putting them is a good reflex. If doing so, do not forget to properly dry them with appropriate paper wipers. When working, only one hand (a glove) is put in contact with the chemicals (displacements of the basket, cleaning with towels...). The second hand touches only clean objects like guns (water and nitrogen), control knobs, covers, etc ... If the second hand is used in urgency it will be already protected





**WHEN YOU WEAR THIS EQUIPMENT, IT IS STRICTLY FORBIDDEN TO LEAVE THE WET-BENCH AND TO USE OTHER DEVICES IN THE ZONE LIKE PHONE, COMPUTER, MICROSCOPE...
IT IS ALSO FORBIDDEN TO TOUCH OTHER THINGS THAN TOOLS WHICH ARE ON THE WET-BENCH : DO NOT TOUCH PENS, TWEEZERS, FACIAL SCREEN, APRON, YOUR FACE ...**

Handling of chemicals :

1. **Never put bottle on the floor!**
2. **The bottle is put on the wet-bench** under exhaust !
3. **Read the label** before opening the bottle and be sure you're clear with the associated hazards.
4. Handle and open only **one bottle at the time**, this to prevent to cross the caps and avoid mix of chemicals
5. **Pour only the quantity you need**
6. **NEVER put back the chemical in the original bottle!** Use appropriate waste.
7. **Close the bottle immediately** after use.
8. **Rinse the closed bottle with water gun** of the wet-bench and dry with paper.
9. **When finished, rinse** beakers and all the things you used. The water must be trashed in the "rinse-glove"
10. **Before to put back the bottle in the cupboard, rinse it** in the "rinse-glove" and dry with paper. Next user will handle clean bottle free of chemicals.
11. **Empty bottles must be rinsed 3 times inside and outside by filling with DI water** (close and shake the bottle) and trash into the "rinse-glove". Don't forget that people who will handle the bottle outside of the clean room will do it without any glove so the bottle must be very clean and dry! These empty bottles are put in the "SAS Materiel" under the metal bench.



Safety rules to use Wet-Benches of CMI



Behaviour during work :

1. **Rinse gloves after every handling** (example : plunge a carrier in a bath) and clean the working area with a wet tissue (many clean and rinse with wet tissue and dry with paper at the end), and rinse again the gloves. Chemical gloves can be considered as “clean” on a wet-bench but should be considered as a source of contamination for the rest of the clean-room.
2. **Do not touch the knob with fingers that were in contact with chemical.** To press a button, make sure that your glove is clean and dry, and fold your finger like on picture



3. **Never wipe acid droplets with paper** : risk of ignition and fire once paper will be dry ! Always use wet tissue to clean the bench.



4. When introducing carrier in the bath, withdraw the cover and place it **up side down** (clean side in contact to the bench).



Safety rules to use Wet-Benches of CMI



5. It is **strictly forbidden to remove the handles of carriers** to close the bath.
6. When working on a wet-bench, **you must stay near it** during all the process duration.

For unattended work (e.g. long chemical treatment), it is compulsory to fill in a contact form:

Labels to be filled when leaving chemicals/equipment without operator	
Username	
Lab	
Date / Time	
How to contact me Phone ... Office ... Mail ...	
Chemicals involved	
Equipment used	
Expected end/return	
Remarks	

Cleaning after work :

1. **Cleaning must be done by everybody !**
2. **Never waste solvent neither in “rinse-gloves”, nor in water tanks !** Use labelled waste trash can dedicated to this purpose.
3. **Clean all the droplets of chemicals with wet tissue to dilute it**, and push the water with nitrogen gun in the holes of the bench. Dry water droplets with paper.

Prepare to tidy chemicals :

1. **Never put bottle on the floor!**
2. **Bottles must be cleaned before to put them back in the cupboard.** Thus, outside part is rinsed and cleaned with paper. Cleaned bottles are placed on the wet-bench while you remove protections (facial mask, apron and gloves)

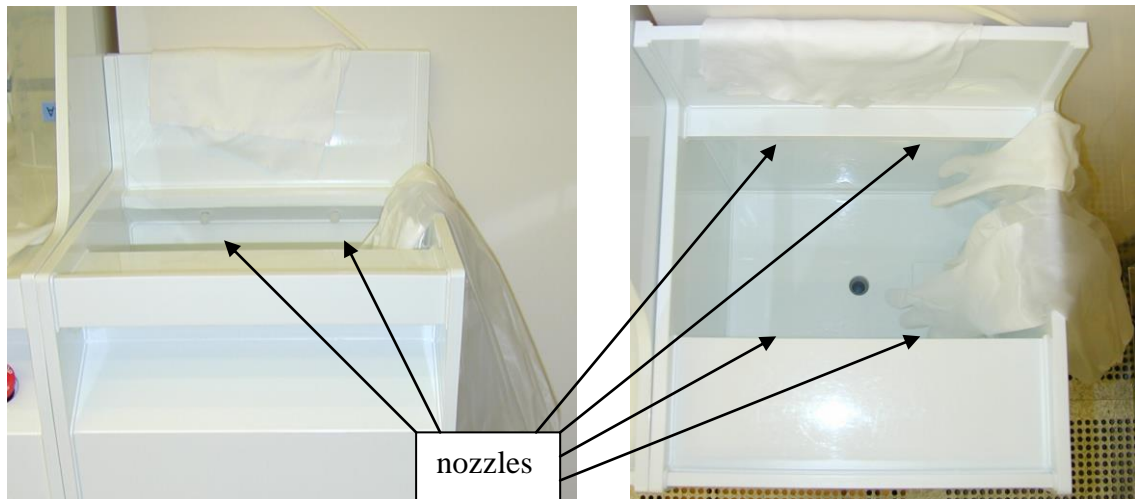


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Leave the wet-bench :

1. **After checking that the wet-bench is clean and dry**, remove the protections on the opposite way you dressed: remove gloves, facial mask and apron.
2. **Put the bottles back in the appropriate cupboard.**
3. **Logout** on zone computer.
4. **Rinse-gloves must be clear also.** Gloves and tissues must be put on the walls of the rinse-gloves to dry, NOT in front of the nozzle (see picture)!



These rules are for ALL the wet-benches of CMI. Possible specific changes are described precisely in the directions for use of the concerned wet-bench!

Colors for labels in CMI are :

- Solvents in green
- Bases in blue
- Acids in red
- Miscellaneous in yellow



What to do in case of chemicals projection

Eye injuries by corrosives substances

Wash the eye zone with a large amount of water (eye showers, douche) for approx. 10min. Maintain the eyelid open with the help of the fingers.

Skin chemical burns

Remove immediately the contaminated clothes. Wash thoroughly the wounded body parts using the safety showers for approx.10min.

- 1) **Call immediately the EPFL emergency number 115**, and precise:
 - a) The location of the accident.
 - b) What chemicals are involved (very important to get adapted means of action).
 - c) How many people involved and to what extent (hand, full arm...).
 - d) Your name as a contact person + phone number.
- 2) Forbid access to the contaminated area to persons other than CMi staff or safety crew (to prevent propagating the contamination).
- 3) If you wish to help, protect yourself first with **correct and adapted** personal protective equipment (apron, face shield, gloves).
- 4) Take care not to spread the contamination when going to the eye-wash and safety showers.
- 5) Be careful of splashes when rinsing.
- 6) Rinse the wounded body parts and wait for the safety crew.