CIBA/ESP Nanofabrication Laboratory Safety Quiz

Please answer all the following questions below in the following FIVE sections.

I. Use of Compressed Air and Vacuum Pump Lines

Please answer the following 7 questions with a YES or NO.

1. Do the spin coater and the laser writer share the same vacuum pump? (YES or NO)
2. Do the spin coater and the laser writer share the same air compressor? (YES or NO)
3. Can the spin coater and the laser writer be used simultaneously? (YES or NO)
4. Do the spin coater and the plasma cleaner share the same vacuum pump? (YES or NO)
5. Can the spin coater and the plasma cleaner be used together? (YES or NO)
6. Do the desiccator and the laser writer share the same vacuum line? (YES or NO)
7. Do the desiccator and the spin coater share the same vacuum line? (YES or NO)

Please answer the following TWO questions by listing out all valid choices (e.g.: C & D; ALL OF THE ABOVE)

8	Which of the following equipment uses pressurised air from the air compressor?
A	Laser writer
B	Spin coater
C	UV exposure tool
D	Plasma cleaner
E	Compressed air gun

9	In which of the following situation can compressed air be used to blow clean/dry samples using the compressed air gun?
A	When the laser writer is in operation but the compressor is not building up pressure.
B	At any time regardless of other equipment operation.
C	When only the spin coater is in use.
D	When the compressed air valve to the spin coater is closed.
E	When the plasma cleaner and UV exposure tool are operational.

Please answer all remaining questions by selecting the correct answer.

II. Plasma Cleaner

1	As a precaution, supplying power (by toggling the RF Level switch) to the Plasma Cleaner should only be supplied _____.
A	As the first step in preparing the plasma cleaner for use.
B	right after venting the chamber to equalise with atmospheric pressure
C	right after samples have been loaded onto the glass plate in the chamber at atmospheric pressure
D	after evacuating the chamber and the target pressure has been achieved through controlled air bleeding

2	When the plasma treatment is complete, the proper procedure is to _____.
A	the barometer should be checked to ensure they do not hit the top of the meters as you vent the chamber in part to ensure that treated samples are not disturbed by violent venting
B	open the plasma chamber only after needle valve is wide open, there is no more air flow as indicated by the air flow beads before applying pulling pressure on the chamber door so not to crack the glass chamber itself
C	seal the chamber in vacuum by shutting the needle valve, putting the door on the chamber entrance, briefly evacuate the air in the chamber and shutting the vacuum valve at the back of the plasma cleaner
D	shut down the vacuum pump after completing its usage because prolonged pumping results in backstreaming of oil from the vacuum pump which will contaminate the entire vacuum line and connected equipment
E	All of the above are good operating and safety practices.

III. UV exposure

1	While conducting UV exposure, you should NOT:
A	Ask individuals without eye protection to leave, especially when the UV lamp is on and the enclosure is open.
B	Board up the apparatus for shielding especially when the UV lamp shutter is open.
C	Leave the UV power supply running for another 15 minutes after turning off the UV lamp so that the cooling system is powered to cool down the lamp before full shutdown.
D	Place your hands in the way of the UV illumination while the shutter is open and exposure is in progress.

IV. Laser Writer & Chemical Handling

1	The laser writer is covered with a white optics cover and a translucent brown cover lid. When can the optics cover and cover lid be opened?
A	Both can be opened at any time.
B	To check the laser before exposing, and to load/unload masks for the cover lid.
C	The optics cover should never be opened, and only to load/unload masks for the cover lid.
D	Only when the compressed air and vacuum valves to the laser writer are closed.

2	Resist Development and Chrome Etching should be done _____.
A	inside the enclosure surrounding the laser writer
B	on the chemical tray in the glove box
C	on the workbench next to the sink
D	on the office desks in the lab

3	Which of the following is FALSE in relation to safe emissions control of chemicals in the lab?
A	The lab is weakly pressurised with filtered air to create a clean working environment which also means that any chemical vapour will be exhausted into the outside corridors and surrounding lab/office spaces.
B	The air in the glove box is constantly exhausted and serves as an enclosed fume hood for chemical processing.
C	As a rule of thumb, all chemicals with designated waste bottles should only be opened & used in a fume hood.
D	The nearest chemical spill kit is located in the CIBA Chemistry Lab.

4	The following are good waste disposal practices EXCEPT:
A	Syringe needles, used/broken glass slides and silicon substrates should be disposed in the yellow sharps bin. Broken glassware should be disposed of in the larger paper sharps bin.
B	Chemicals without designated waste containers (i.e. DI, IPA and small quantities of acetone) can be disposed of by pouring them down the sink, and paper towels soaked with them can be disposed in the general waste bin.
C	Paper towels/tissues in contact with chemicals that have designated waste containers should only be disposed contained within inverted hand gloves as you dispose your hand gloves into the general waste bin.
D	PPE, plastic containers for PDMS casting & curing, and paper towels used to prevent PDMS contamination of the workbenches are to be disposed in the general waste bin.
E	All of the above are good waste disposal practices.

5	When bringing in a new chemical for use in a lab, one should:
A	Notify your project supervisor and/or designated person responsible for that lab and/or fellow lab users.
B	Update the lab's Risk Assessment, MSDS, Chemical Inventory and SOP files.
C	Plan for proper handling and waste disposal of the chemical in that lab, and if necessary, provide the needed PPE and labelled waste containers.
D	When necessary, provide a label containing the full chemical name, date created and your name for the chemical bottle.
E	Like it or not, all of the above must be done!

6	Which are the following is INCORRECT regarding use/handling piranha etch/Nanostripper solutions:
A	Piranha etch/Nanostripper solutions should only be used and handled inside the Chem Lab's fume hood.
B	Heavy duty latex gloves and lab coat should be donned in handling piranha etch/Nanostripper solutions.
C	Care must be exercised in preparing piranha etch for use (mix H_2O_2 into H_2SO_4 and never the other way round) and in cleaning organic materials as it is an exothermic process. Nanostripper can be used from stock solution and is far less exothermic in reacting with organic compounds during cleaning.
D	Piranha etch and Nanostripper solutions are disposed into the same waste container after use.
E	All of the above is correct.

V. PDMS Casting & Moulding

1	Which of the following MSDS warnings/ precautions is NOT APPLICABLE to the PDMS Elastomer Kit chemicals?
A	The curing agent releases formaldehyde vapours and generate heat and gas when heated above of 250 °C.
B	The hazard classification for both the curing agent and base is not hazardous.
C	The base is classified as a carcinogen and teratoma causing agent.
D	The user should avoid contact of curing agent and/or base with their skin and eyes.
E	All of the above are applicable to the PDMS base and curing agent.

2	The vacuum desiccator in the Chemistry Room should be opened _____.
A	when the desiccator is still in partial vacuum
B	by sliding the cover off sideways because vacuum grease around the lid makes it hard to open
C	by pulling the cover upwards because vacuum grease shouldn't prevent easy release of the lid
D	promptly to minimise contamination from air