

Section 1 - Personnel capability checklist for laboratory procedures PRODUCTION LABORATORY

During training, each person who will be working in the lab needs to complete this list with initials as they master skills and gain knowledge. Only after this list is complete, can a new user work alone in the lab.

NAME: _____

	Item	Date	Personnel initial	Trainer initial
SAFETY / PROCEDURES INFORMATION	Understand the primary hazards associated with exposure to concentrated HF, HClO ₃ , HCl, HNO ₃ , and Be. Have read MSDS for the chemicals we handle			
	Understand the proper personal protective gear to wear for each step in the laboratory.			
	When do you need to wear goggles?			
	Understand the meaning and importance of the blue, yellow and green sections of the lab.			
	Where is the first aid kit?			
	Where is the safety shower?			
	Where is the eyewash?			
	Know the meaning of red and yellow alarms.			
	Understand why we always use spill trays when pouring any chemicals.			
	Understand why any and all acid use must be done in a hood.			
	Know the safe working area of the hood deck.			
	Understand why the hoods and lab counters must be kept free of clutter.			
	Understand why unattended operation labels on the hoods and the vestibule are critical for safety			
	Understand why cleaning/cross talk prevention/ following the methods exactly are important for quality and safety.			
	Where do you find hot plate temperatures?			
	Where do you find cleaning instructions for lab ware?			
	Understand the importance of the A-L positioning?			
	Know the 3 important things to do that preserve the Eppendorf repipettors (never leave in the hood, store vertically in open air, press tabs before inserting tip, never twist the tip or adapter)			
Where does Be- contaminated waste go?				

	When and where do you wash your hands after working in the lab?			
	When do you change the sticky matts?			
FINAL ETCH	Know why we do the final etch and where the instructions are located			
	Know where the final etch beakers are located.			
	Understand what protective gear to wear at different steps of the final etches process.			
	Understand why it is important to label both the tops and sides of final etch beakers			
	Understand how to rinse beakers			
	Understand why it is important to only have one beaker and one quartz tube open at a time			
	Understand how to wash quartz tubes and why			
	Understand how to add acid to the final etches. Know where the HF repeater is located.			
	Understand how to set the ultrasound timer			
	Understand how to wash out and dry final etches			
	Know where static reducer is located and how to use it to improve efficiency of quartz transfer			
	Understand how to clean and store final etch beakers			
	Understand why and when red dot is added to the top of the tubes once final etch is completed			
	QUARTZ WEIGH IN	Know why this is a two person job.		
Know and understand how and why we check balance calibration.				
Know how to prepare dissolution bottles.				
Know how to set up a batch sheet.				
Understand the importance of using the anti static device.				
Know how to mass in samples and carrier including proper use of pipettes.				
Know and understand how to determine the quartz mass to dissolve.				
Understand why we save the batch sheet after every new mass is added.				
Understand why we run blanks with every batch of samples and how those blanks are made.				
Understand how to print and label the batch sheet				
SHHETS	When are batch sheets scanned?			
	What needs to be included on a batch sheet before it is scanned?			
	Understand the importance of writing acid lot numbers on batch sheet			

BATCH	What data are entered into the batch sheet file in the computer?			
	What color do you highlight the batch sheet in the folder, batch sheets?			
	Where is the batch sheet placed after scanning?			
ADDING ACID TO QUARTZ	Know when to do this and what protective gear to use.			
	Know what equipment to place in the hood and why.			
	Understand why a spill tray is very important for this step.			
	Understand why squeezing the digestion bottle is very dangerous once it is filled with acid.			
	Know why it is important to wet the quartz with MilliQ water before adding acid.			
	Understand why it is important to let samples stand cold for at least an hour.			
	Understand why the sash needs to be down for this procedure and why nothing else should ever be done in the hood while quartz is digesting.			
	Know why ramping up is done slowly (only 5 to 10 degrees per step) with plenty of time between steps.			
	Know what samples look like when it is OK to raise the temperature and what samples look like when it is not OK to raise the temperature.			
	Know what to do and what not to do when samples are ramped too fast and start to boil.			
	Know the maximum sample digestion temperature.			
ICP ALIQUOT	Know why this is a dangerous job and how to protect yourself.			
	Understand why you should not block any of the hood grates.			
	Know what teflon ware to bring out and which beakers get labeled, why and how.			
	Understand why proper arrangement of beakers on the cart is important.			
	Understand why it is important to check balance calibration.			
	Know why having a waste beaker in the hood is important.			
	Understand how to get accurate masses with the balance in the hood.			
	Know why it is important to change pipette tips between every sample and have a plan that ensures the tip gets changed at the right time.			

	Understand where to record aliquot masses.			
	Know how, what and how much acid to add to the samples and the aliquots.			
	Know how to clean digestion bottles.			
	Know how to clean repipette tips.			
	Know how to set hot plate temperatures correctly and when to increase the dry off temperature.			
	Understand why and how to clean the digestion rack and other equipment used in this step.			

BRINGING UP ICP ALIQUOTS	Know to what temperature the hot plate should be set and why.			
	Know when it is safe to bring up aliquots.			
	Understand why it is important to check the balance with the check weights and record the result.			
	Know why the Ga and Y spiked dilutant is used in this step			
	If the repipettor is used, understand why using a new tip for each batch is important.			
	Understand why it is important to tighten the lid of the aliquot beaker and to heat the beaker for at least a few hours.			
	Know why it is important to vortex each beaker.			
	Know why it is important not to rinse the beakers into the test tubes after the acid has been poured out.			
Know how to clean the beakers.				
PERCHLORIC DRYDOWNS	Know what to place in the hood before starting this process.			
	Know the personal protective equipment to wear when doing this procedure.			
	Understand how to handle the repipettor during this step so as to limit damage from acid fumes.			
	Understand why it is critical not to work in the hood during this step, to avoid waling in front of the hood while the acid is evaporating, and to make sure the sash is all the way down.			
	Know how much Perchloric Acid to add and how many times to add the acid to the samples.			
	Know how to run the washdown and why it is important.			
HCL	Know what is the best temperature for starting the process and why.			
	Know what to place in the hood before starting this			

	process.			
	Know the personal protective equipment to wear when doing this procedure.			
	Know how much acid to add to each sample.			
	Understand what is learned by using the mirror to check the samples and why it is important.			
	Know what is the right temperature to dry off the HCl.			
	Know why this process is important.			

ANION COLUMNS	Explain why the bottom cap must always stay on longer than the top cap.			
	Know when a column needs to be replaced.			
	Know what to place in the hood before starting this process.			
	Know the temperature that the samples and hotplate need to be before starting this process.			
	Know where the acid-washed tubes are stored and how to label them for this step.			
	Understand how to transfer samples from beakers to acid washed tubes in a way that maximizes sample recovery and ensures sample ID is correct.			
	Know how to centrifuge the samples the proper time and speed for centrifuging, and the reason we centrifuge.			
	Know how to set up the column rack and columns.			
	Understand the column stripping process and what it does.			
	Understand the column conditioning process and what it does.			
	Understand how to properly label beakers to capture the elutant from the anion columns.			
	Understand how to load samples onto the column without transferring solids that could plug the column.			
	Know how to elute samples.			
	Understand why H ₂ SO ₄ is added to the samples once they have eluted from the anion columns.			
	Understand why the column acid is diluted before being poured down the sink.			
Explain how the column rack and reservoirs are cleaned.				
POST-	Know what is the best temperature for starting the process and why.			
	Know what to place in the hood before starting this process.			

	Know what reagents to add during this procedure, where they are stored and how to make up more			
	Know what color the samples might be.			
	Understand what is learned by using the mirror to check the samples and why it is important.			
	Know when to use new peroxide.			
CATION COLUMNS	Explain why the bottom cap must always stay on longer than the top cap.			
	Know the temperature that the samples and hotplate need to be before starting this process.			
	Know where the cation column acids are stored.			
	Know how to set up the column rack and columns.			
	Understand the column conditioning process, what it does, and the steps involved with the two different acids.			
	Know how to properly label three sets of beakers used in this step with colored tape.			
	Know how to bring samples back up for loading onto the column.			
	Understand how to transfer samples from beakers to columns in a way that maximizes sample recovery and ensures sample ID is correct.			
	Know how to elute Ti and the importance of watching the red band so as to know when to add more acid for this step.			
	Know when to switch beakers and change acids in order to capture Be and then Al fractions.			
	Understand why the Ti beaker is retained until the yield test is completed.			
	Know how to organize the beakers in the dry block.			
	Understand why nitric acid is added to Be fraction before it is dried off.			
	Know how to strip and wash columns.			
	Know the temperature at which samples are dried off.			
	Understand why Nitric Acid is added to the Be samples once they have eluted from the cation columns and before drydown			
	Understand why the column acid is diluted before being poured down the sink.			
Explain how the column rack and reservoirs are cleaned.				
RED	Explain what you should find in the beakers after column drydown.			
	Know what is the best temperature for starting the			

	process and why.			
	Know what to place in the hood before starting this process.			
	Explain how much of what acid is added to the beakers and why they need to sit for at least 30 minutes on the warm hotplate.			
	What will you do with 24 acid-washed tubes?			
	Why are samples vortexed in their beakers?			
	How are samples transferred from the beakers to the labeled acid-washed test tubes?			
	Why are the beaker labels transferred to the purple cap tubes?			
	How are the beakers cleaned?			
REMOVING YIELD TEST	Know which pipettes and tips need to be taken out for this process.			
	Know how to arrange racks and test tubes in a way that minimizes the chance for confusion and cross-talking			
	Know where the yield test solution is stored.			
	Know how to label the acid washed tubes into which your samples will go.			
	Know how to label the unwashed tubes into which the ICP yields will go			
	Know how large the aliquot should be from the Be solution and the Al solution.			
	Know why and when the pipette tips should be discarded so as to prevent sample cross talk.			
	Know how and how much yield test solution should be added to each sample.			
	Know why it is critical to vortex every sample after dilution.			
	PRECIPITATING AND	Know why a drop of methyl red is added to every tube.		
Know where the precipitation supplies are stored.				
Know how to gauge how many drops of base are needed to neutralize the acid in the samples.				
Know how long the samples should sit before centrifuging and washing.				
Know how long and at what speed the samples should be centrifuged.				
Know how to decant samples keeping the jell.				
Understand how to wash sample jells and why we do this washing.				
Know why it is important to remove as much water as possible from above the jells prior to drying off the samples.				
Know what to do with the Al jells.				

	Know why the hotplates need to be set to 65 degrees for the initial dry off and then increased to 98 degrees for the final dry off.			
	Know what to do with samples when drying is finished.			
	Why are samples dried down only in hoods where nothing else is happening?			

ACIDS	Where should acids be made up?			
	What should go in the bottle first? Acid or water?			
	Do you need to agitate bottles after making acid?			
	Do acid concentrations matter?			
	Where do you find acid recipes?			