ICP-MS User's Booklet

1) Stretch and hook the tubing onto the peristaltic pump, and click on the tubing clamp locks.



 Check the argon cylinder pressures to estimate how much argon is remaining. A full cylinder will have around 2200 psi. A full cylinder will last approximately 5 hours of use.



3) Double-click the "LSA Chemistry Recharge" icon :



 4) Enter your username, your PI's username, and your shortcode and click OK:

🚊 LSA Chemistry Recharg	e X
Help	
General Information	
Instrumentation Name	ICP-MS
Computer Name	NEXION20000-PC
U-M Affiliation	Internal O External
U-M Uniqname	jwindak
Account Information	
PI Uniqname	jwindak
Shortcode	199990
http://rsn.lsa.umich.edu	Cancel Ok

5) The Syngistix software will automatically come up



6) After Syngistix loads, you can turn on the plasma:



If the plasma successfully ignites, the indicator will turn green:



Also, the plasma itself may be viewed at the front of the instrument:



7) If you have previously created a workspace, you can open this workspace by clicking on the main Syngistix icon:



Opening your workspace will give you easy access to all of your methods, sample lists, and data sets.

8) If you need to create a method, or to edit an existing method, click on the "method" icon on the toolbar:



This will bring up the method screen. There are 9 sub-tabs in the method screen. The important ones are "Timing", "Calibration", and "Sampling". First, click on the "Timing" tab, in order to enter the elements and internal standards you wish to use.

Please note:

For internal standards, we have an internal standard mixture that is automatically teed into the sample solution flow. The internal standards which are present are Bismuth, Holmium, Indium, Li⁶, Scandium, Terbium, and Yttrium.

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Rep	licates		Est. Sample	Time						
3			0:00:09.03	6 📃 Ena	ble QC Check	ing				
	Int Std	Analyte	Mass (amu)	Scan Mode (*)	MCA Channels	Dwell Time per AMU (ms)	Integration Time (ms)	Corrections	Profile (*)	
1		Ir	192.963	Peak Hopping	1	50	1000		Standard	
2		Cr	51.9405	Peak Hopping	1	50	1000		Standard	
3		Bi	208.98	Peak Hopping	1	50	1000		Standard	
4										
5		<mark>ר (</mark> ` In	sert Ele	ments						
Here										

You can enter elements in the "Analyte" column by either tying in the symbol for the element, or by clicking on the element in the periodic table.

To group elements together to use with an internal standard, first highlight the rows you wish to group:

Quantitative Analysis Method - C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\Method\e								
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1		Ir	192.963	Peak Hop	ping	1	50	1000
2		Cr	51.9405	Peak Hopping		1	50	1000
3		Bi	208.98	Peak Hopping		1	50	1000
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Then click on the arrow below the Method icon, and click on "define group"

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Quar	ntitativ	e Analysis	Method - C:\	Us <mark>s</mark> \Pi	ublic\Do	CI Define	Group	Syngisti	CPMS\Me
						<u>R</u> emov	e Group		
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1		Ir	192.963	Peak Hop	oping	1	50		1000
2		Cr	51.9405	Peak Ho	oping	1	50		1000
3		Bi	208.98	Peak Hop	oping	1	50		1000
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Next, highlight only the row for the internal standard row. Then click on the method icon arrow, and click on "Set Internal Std"

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Rea	dings	/ Replicate	Est. Replicat	te Time Conditi	ons File							
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	Std	Analyte	(amu)	Scan Mode (*)	Channels	per AMU (ms)	Time (ms)					
1	Ľ	Ir	192.963	Peak Hopping	1	50	1000					
2		Cr	51.9405	Peak Hopping	1	50	1000					
3		Bi	208.98	Peak Hopping	1	50	1000					
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After this has been done, the elements should appear grouped together with an arrow pointing at the internal standard element

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Tim	ing	Processing	Equation C	alibration	Samplin	ng Devices	QC Report	lotes
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1	Г	Ir	192.963	Peak Hop	ping	1	50	1000
2		Cr	51.9405	Peak Hop	ping	1	50	1000
3	3 🏎 Bi 208.98 Peak Ho			Peak Hop	ping	1	50	1000
个 Elements are grouped together with an arrow pointing								
	\uparrow	Eleme	nts are	group	ed to	ogether	with an arr	ow pointin

Next, click on the "Calibration" tab. The important items to set are what type of curve to use (simple linear usually works best), what type of units (usually ug/L) and the concentrations of your calibration standards (I recommend 1, 5, & 10 ug/L)

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0 9	std. A	ddition		↓ Cu	rve ty	pe			↓ Se	et concen	trations
	Int Std	Analyte	Mass (amu)	Curve T (*)	Гуре	Sample Units (*)	Standard Units (*)	St	:d 1	Std 2	Std 3
1	Г	Ir	192.963	Simple Linea	ar	ug/L	ug/L	1		5	10
2		Cr	51.9405	Simple Linea	ar	ug/L	ug/L	1		5	10
3	4	Bi	208.98	Simple Linea	ar	ug/L	ug/L				
4											
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Finally, click on the "Sampling" tab. In this tab you define where your blank and calibration standards will be located in the autosampler tray.

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Ti	Timing Processing Equation Calibration Sampling Devices QC Report Notes									
F	Peristaltic Pump					Auto	Diluter			
		Time Speed (sec) (+/- rpm			Dil. Factor				Dil. To Vol.	1
	Sample Flush	30		-100.0						
	Read Delay	15		-35.0	1st. Dil. Pos		5	Probe Purge	1	
	Analysis			-35.0	1			10		
	Wash	20		-35.0						
V	Peristaltic Pump Ur	nder Co	mpute	er Control			↓	set	Autosample	r location
	Standard			Solution	ו ID		A/S Loc	5 :.	Wash Override (sec)	
1	Blank		Blank				101			
2	Standard 1		1 ppb	o Cr & Ir			102			
3	Standard 2		5 ppb	OCr&Ir			103			
4	Standard 3		10 pp	ob Cr & Ir			104			

Type in names describing each solution ↑

After you have finished creating a method, you should save it by clicking on the Syngistix icon and clicking on "Save As". You will then have a method that can be used for analyzing those particular elements.

Here is a picture of the autosampler tray, showing how the locations are numbered:



9) Click on the "Sample" tab to set up your samples to run:

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	Syngistix	Applications									
Contro	DI Diagnostics	SmartTune Conditi Optimi	ons LogBook	analyze	the Sample	Review					
Samp	les -	- MS\Sample\11-6-17 Fe Test.sam[Modified]									
	↓ Then click on the Batch tab										
Man	Manual Batch										
A	Analyze Batch Se Manual Sam	Sample Te	emplate S	Summary Build Run List							
Batch Index	A/S Loc.	Batch ID	Sample ID	Measurement Action (*)	Method (*)	Desc					
1	105	Jim 11-13-17	Sample #1	Run Blank, Stds. and Sample	ir & cr.mth						
2	106 Jim 11-13-17 Sample #2 Run Sample ir & cr.mth										
3	107	Jim 11-13-17	Sample #3	Run Sample	ir & cr.mth						
4											
5											

To fill in the Batch table for your samples, first enter where the sample is located in the autosampler tray. Next, give an ID name for the Batch. Then give each sample a name under Sample ID.

For the first sample in the list, the Measurement Action should be "Run Blank, Stds. And Sample". For every sample after that, the Measurement Action should be only "Run Sample".

Finally, enter the method to use used to analyze the samples.

10) All of the sample rows you wish to run must be high-lighted.

Sample	es - C:\User	s\Public\Documer	nts\PerkinElmer Syngistix\ICP	MS\Sample\ajc-1-4-2018-Li-pas	ss-soak_vs_cycle_Pt-standard.sa	m[Modified]
Manua	al Batch					
Ar	nalyze Batch	Sample T	emplate Summary	Build Run List		
Use	e Manual San	npling (No autosam	pler)			
Batch Index	A/S Loc.	Batch ID	Sample ID	Measurement Action (*)	Method (*)	Description
1	105	Jim 11-13-17	Sample #1	Run Blank, Stds. and Sample	ir & cr.mth	9
2	106	Jim 11-13-17	Sample #2	Run Sample	ir & cr.mth	S
3	107	Jim 11-13-17	Sample #3	Run Sample	ir & cr.mth	S
4						
5						
6	- 1	All rows	must be high-lig	ghted.		
7						
8						
9						
10						
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•		-				

11) Then click on "Analyze Batch" to run the samples.

Samp	oles - C:\User	s\Public\Document	ts\PerkinElmer Syngistix\ICP	MS\Sample\ajc-1-4-2018-Li-pass-	soak_vs_cycle_Pt-standard.sam[N	Modified]	
Man	ual Batch						
- / - Us	Analyze Batch se Manual Sam		ck on Analyze I	Batch			
Batch Index	A/S Loc.	Batch ID	Sample ID	Measurement Action (*)	Method (*)	Description	^
1	105	Jim 11-13-17	Sample #1	Run Blank, Stds. and Sample	ir & cr.mth		Sa
2	106	Jim 11-13-17	Sample #2	Run Sample	ir & cr.mth		Sa
3	107	Jim 11-13-17	Sample #3	Run Sample	ir & cr.mth		Sa
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12) When the samples are finished, click on the "Reporter" icon to display the report. Click on the Export All button to export the data.

Simple States	University of the state of the	ck on the Reporter i the California Generator Forence Reserved Reterio	icon to display the report.
Report View	Anagor () Results	1 wook now 11 wendle Diagnamics	O Calibration
Current Sample Raw Intensities Net Intensities Concentra	ons Unfactored Concentrations Internal Standard	el œ	Prot.
Sample Id R Acquisition	Time QC Status As 75 Ho 165 (6)	As /s - Calibration
1 Bank R 12/24/037 804 2 1.500 Å R: 12/24/037 804 3 5.800 Å R: 12/24/037 804 4 5.000 Å R: 12/24/037 804 5 5.000 Å R: 12/22/037 805 6 Calibration Curves R: 12/22/037 805 7 Central Blank R: 12/22/037 805	5 AM 5 AM 5 AM 5 AM 3 BJ022 5 AM 28 AM 28 AM 5 AD75 5 A75		
Click on	Export All to	export the data \downarrow	Image: Concentration (ug)() Concentration (ug)() Statistics Calibration Table 6p1 y = 0.015r - 0.001 Concentration (ug)() Arr5 (ug)() Bit () 20.005 r - 0.001 Concentration (ug)() Arr5 (ug)() Bit () 0.04006 Bit () 0.04006 C() 0.01223 U() 0.01223 C() 0.01223 C() 0.01223 C() 0.01223 C() 0.01223 C() 0.01233 C() 0.0123 C() 0.0123 C() 0.0123 C() 0.0123 C() C() C() C() C() C() C() C() </th

After you click on Export All, it will ask you where you wish to save the report and to give it a file name. It exports all of the data into an Excel spreadsheet. The picture of the calibration curves, however, does not get exported. The only way to save a picture of the calibration curves is to click

on the Print button near the top of the calibration curve, and then save it as an Adobe pdf.

13) When you are finished using the instrument, click on the Control icon.You can then turn the plasma off.



14) Finally, close the Syngistix software. Please note, there is a bug in the software. When you try to close Syngistix, you will see an error message that Syngistix has encountered a problem. Click on "Close the Program"



15) Un-do the tubing clamps and un-hook the tubing from the peristaltic pump:

