A. Pre-startup Checklist

1. Make sure that the ICP Exhaust Ventilation System is running. The ventilation fan switch must be in the ON position and the “fan running” LED lamp is lit up green.

2. Make sure that the ICP-OES water chiller inside the chase in room OG-3 is running and delivering 50 psi at 18°C chilled water.
3. Make sure that the liquid Argon tank “Gas Use” valve is fully open, the pressure regulator is set at 80 psi and the pressure regulator delivery valve is fully open. Make sure that the liquid Argon tank pressure safety relief valve is not ruptured and exhausting gas. If the pressure safety relief valve is ruptured, STOP, leave the room and contact Dr. Ada immediately.

4. Make sure that the spray chamber drain tubing is inserted securely into the plastic drain vessel located at the floor and next to the ICP-OES. If the drain vessel is more than ¾ full, contact Dr. Ada immediately for disposal.
5. Make sure that all tubing on the spray chamber, nebulizer, peristaltic pump, and SPS4 Autosampler are installed and correctly connected. Make sure that the 5110 ICP-OES front panel power button (lower left corner of the instrument) is lit up green and not flashing.

6. Make sure that the Agilent SPS4 Autosampler is powered ON. If it is not powered ON, press the power toggle switch (upper left corner of SPS4 Autosampler) to the ON position. The Autosampler probe will initialize and calibrate its range of motion during power up.
1. Exhaust
2. Air inlet filter
3. Cone and axial pre-optics window
4. Cone and radial pre-optics window
5. Induction coil
6. Torch
7. Nebulizer and make-up gas connections
8. Torch loader handle
9. Spray chamber
10. Nebulizer

11. Peristaltic pump
12. Mains power switch and power cable
13. Front panel power button
14. LED instrument status indicator
15. Torch compartment handle
16. Water assembly
17. Optics purge filter for Ar or N₂

18. Gas supply assembly
19. Advanced Valve System (AVS) switching valve (Not Available on our ICP-OES)
20. Drain for liquid overflow
B. Connecting the PC Host to the ICP-OES Instrument
   1. Only needed if power failure. If no power failure, skip to section C.
      i. Make sure that the ICP-OES host PC is ON and the PC monitor is ON.
      ii. Log into the Windows 10 PC host: Username: icp-oes user; Password: 5110oes
      iii. Start the “ICP Expert” software by double-clicking on the desktop “ICP Expert” icon. The Main Index window will appear.
      iv. Click “Instrument”.
      v. Click “Connect”.

   2. Click “X600.Local” to establish connection to the ICP-OES instrument.

   3. Make sure that the LED instrument status indicator turns steady green. If the LED instrument status indicator does not turn steady green, contact Dr. Ada immediately.

C. Autosampler Status
   1. Click “Autosampler”. Make sure that the status indicated on the Autosampler window is in the “Idle” state. Close the Autosampler window.
2. On the “ICP-Expert” software, click on “File” and then “Options”. The “Options” window will open.

3. On the “General” tab of the “Options” window, edit the “Default Folders” to your assigned user folders on the Agilent 5110 PC. Use the Browse tab to create your folders.
D. Preparing for Analysis

1. Make sure that the peristaltic pump is correctly setup. Refer to Peristaltic Pump section of ICP-OES eFamiliarization video or the ICP Expert Help. **Be careful of the Spray chamber.**
2. The rinse tubing with the “gray-gray-gray” colored marker should be connected to the rinse solution reservoir (filled with DI water) on the inlet end and to the input of the fixed wash reservoir of the SPS4 on the exit end.
3. Make sure that the sample tubing ("green-green" colored marker) is properly connected. The sample tubing ("green-green" colored marker) should be connected to the SPS4 sample probe on the inlet end and to the solution delivery tubing ("white" tags) on the ICP-OES peristaltic pump on the exit end.
4. The rinse tubing with the “gray-gray-gray” colored marker should be connected to the rinse solution reservoir (filled with DI water) on the inlet end and to the input of the fixed wash reservoir of the SPS4 on the exit end. The rinse tubing with the “purple-white-purple” colored marker should be connected to the output of the fixed wash reservoir of the SPS4 on the inlet end and to the drain tubing going to the waste reservoir on the exit end.

5. Make sure that the pressure plate and the occlusion arm are properly engaged on the rinse tubings on the wash pump.
6. Click the “Autosampler” button on the Start page. Change Rinse Pump Control Flow to Fast. Then click on the “Rinse 1” button to insert the probe into the rinse reservoir and turn the wash pump On. Using a water bottle, fill the reservoir with water.
7. Use squirt water bottle of DI water to fill the reservoir to assist with the priming. Be sure not to touch the probe.

8. Once the rinse solution is verified to be running down the drain tube into the waste reservoir, change the Flow back to normal by first choosing the Park button, change Rinse Pump Flow Control to Normal, then click on Rinse 1 again.
9. Click the “Pump” button on the Start Page and select **Fast** to start the peristaltic pump.

10. Once the flow is steady, click on “Pump” and choose **Normal**.

11. Click the “Plasma” button in the ICP Expert software. Alternatively, press F5 or choose “Plasma On” from the arrow under the “Plasma” button. The plasma ignition sequence will take about 60 secs to complete. If the plasma fails to ignite, refer to the Troubleshooting section in the Help for further information, or contact Dr. Ada. For optimum performance and stability, **ICP-OES should be allowed to warm up for 20 mins after igniting the plasma.**
A. Creating/Opening a Worksheet
   1. Creating a new worksheet
      i. Click “New” from the “Start” page or the File menu.
      ii. A list of recently used files will be presented when creating a new worksheet from a template. Also, you may Browse for more files.
   2. Opening an existing worksheet
      i. Click “Open” from the start page or from the File menu.
      ii. A list of recently used files will be displayed. Also, you may Browse for more files. The “Open” dialog box will be displayed.
   3. Creating a new worksheet from a Template
      i. Click “New From”.
      ii. A list of recently used files will be displayed. Also, you may Browse for more files. The New From Template dialog box will be displayed.

![File Menu with shortcuts](image)
B. Developing a Method
   1. Open a new worksheet or one from a template.
   2. Enable the Autosampler on the Configuration page.
3. On the Elements page, select the element(s) from the Element drop down box, or type the element name or symbol and then perform one of the following:
   i. Click “+” to add the primary wavelength for the selected element.
   ii. Highlight the wavelength you wish to use from the list of available wavelengths displayed. Click Add.
4. The element will appear in the table with the selected wavelength and default settings selected.
5. Check that there are no known interferents or other analytical lines close to the selected analytical line.
6. Make required adjustments to each element including selecting a different wavelength, entering additional info into the label column, and selecting the type (chose from analyte, internal standard or interferent).
7. Click Conditions to modify both common settings for the run and settings for each element. Up to 4 different conditions for each element can be used, if “Use Multiple Conditions” is checked.
8. Click “Standards” to enter the concentration of the elements in your standards and select whether to use other options such as Standard Additions or MultiCal. Also, select whether to use the blank in calibrations and whether to enable reslope.
9. Click “Sequence” to specify the number of samples, insert QC tests, select the solution type, edit the sample labels and end of run actions.

10. Click the Autosampler tab to select the racks and vial number. These would be automatically populated from the sequence list.
C. Running the samples
   1. To run the samples, set up the autosampler with all solutions to be analyzed.
   2. Click the “Analysis” tab and do the following:
      i. Ensure your samples are selected (indicated by a check mark next to the rack-tube column).
      ii. Click the “Run” icon in the toolbar to begin the analysis. Follow the prompts.

D. Generating the Analysis Report.
E. End of Session

1. Rinse the spray chamber by aspirating the Rinse 1 solution. Click “Rinse 1”. Allow the rinse solution to flow through the spray chamber for 3 mins.
2. Click the “Plasma Off” button to extinguish the plasma. The peristaltic pumps will stop automatically after the plasma is extinguished.
3. Turn off the Polychromator “Boost” (if it was turned On during the analysis setup) on the Status tab on the Instrument window.
4. Loosen the pump tubings on the ICP-OES peristaltic pump and on the wash pump of the SPS4 Autosampler.
5. Close the worksheet.
7. Log your activity on the ICP-OES User logbook.