

# operation

Weekly OPI Cleaning

- 1 Daily Startup Items
- 2 Performing Measurements
- 3 ICALization
- 4 Instrument Shutdown
- 5 Weekly Shutdown Items
- 6 Monthly Shutdown Items
- 7 Changing the pump tubes
- 8 Installing New Nebulizer or Spray Chamber
- 9 Repairs

---

## Daily Startup Items

1. Turn on Argon using either the liquid or the gas (not both); you will be able to hear the argon flowing and the pressure gages will move accordingly.

a. Liquid (big) tank: Turn on both of the green valves and the smaller valve.

\*If the tank appears to be less than an eighth full plan to order another. The ordering process takes about a week; however, a new tank should not be ordered if it would not be in use because the liquid would be wasted if not immediately used.

b. Gas (small) tank: Turn on the top valve and the smaller valve.



2. Turn on the Thermo circulator, which runs the cooling water; the instrument will display 18°C, the temperature at which the water is being cooled. The on/off switch can be found at the back right corner of the instrument.



3. Turn on hood exhaust (probably already on)

4. Clamp the two pump tubes so that they are tightly pressed against the black pump on the side of the ICP. Close the clamp behind the autosampler so that the pump tubes are compressed against the pump. Both tubes should be clamped in top to bottom so that the liquid that travels through the tubes goes the same direction as the wheel (clockwise).

\*Make sure that the tabs are secured in the slots so that the tubes fit tightly against the pump. The tabs are important because the colors are significant of the tubing diameter, which determines the flow rate.

\*Check that waste vessel is empty and autosampler rinse tank is full (3% HNO<sub>3</sub>, trace metal grade). If the waste vessel is full, neutralize the contents with the K205 PQ Lab Spill Kit found in the fume hoods and pour down the sink. If the rinse tank is close to empty refill it. DO NOT let it

empty completely because this might cause problems with the rinse flow.



5. Turn on the Autosampler. The on/off button can be found at the back of the instrument. There is a green light at the front of the instrument to signify that it is on.

6. Load the Smart Analyzer Vision program on the Dell computer. Open the needed method (the last method used is set as the default).

7. Check the system status for errors. Correct system settings are shown below.

Readout System:		Active Devices:		Device Parameter:	
HostCard	Ver. 167 Pld. 003 Jumper 0x000000F1 Memory 256k	Flow Ctrl	Ready	ICal-TransDate	2009-05-28 14:43:02
Client (1)	Ver. 127 Pld. 005 Jumper 0x00000001 Memory 512k	Generator	Ready	ICal-TransInfo	Water_ModLichte
Client (2)	Ver. 127 Pld. 005 Jumper 0x00000001 Memory 512k	Pump	Ready	Cooling Water	0.00 Imp/s (4.9 - 14.0)
		Autosampler	Ready	Hours of Operation	345
		Torch Ctrl	Ready	Hvps Current	74 mA
				Hvps Voltage	415 V
				Optic Temperature	15.01 °C (14.0 - 16.0)
				Osc. Exhaust	232.50 Imp/s (155 - 270)
				Osc. Impedance	0 Ohms
				Osc. Temperature	24.67 °C (40 - 70)

\*To see system status click on the system tab in lower portion of window.

8. Flush with argon using the F-> Icon. This will take 5 minutes
9. Ignite plasma using plasma icon. This will take 2 minutes.

\*The status of the flushing and of the plasma can be seen at the bottom of the computer screen. The plasma will not light until the end. It will be evident though the small window of the ICP. If it does not light try again; however the plasma must be lit in order to effectively use the ICP.

\*Check the OPI pressure, which should be about 5 PSI, and the nebulizer pressure, which should be about 41 PSI (Mod Lichte) or 45 PSI (Scott Cross Flow).

10. Turn on the pump using the "Pump" icon. The black pump on the side of the ICP will begin to move. Set the sample needle over the "rinse" location and select "move to position".

\*Check to make sure acid is flowing. This will be evident by either by looking at the rinse station, which will appear to be overflowing or by looking at the waste tube, which will have liquid passing through.

## Performing Measurements

1. Start the instrument as described above
2. Perform [ICAL](#) if not completed in the last week. (see instrument log).
3. Standardize the instrument using a blank and the high concentration standard. This step only updates the slope and intercept of a previously run calibration curve. (this is update slope and intercept for old Leeman users)
4. Run the check standards and recalibrate using all standards if check standards fail (Calibration).
5. The instrument is ready to measure samples.

## ICALization

1. Start and warm up instrument.
2. Find the iCalization solution and have it ready next to the instrument.
3. Load your method
4. Flush the sample introduction system with 3% HNO<sub>3</sub> for 5 minutes and Q-Water for 5 minutes. (the instrument introduction system must be clean!!!)
5. Place ICAL solution in a designated spot, typically in spot 0/07. In window right click on the ICAL solution location/spot and select move to location.
6. Once the autosampler has moved to/been placed in the ICAL solution Select the function "ICALization" in the "System" menu.
7. Follow the instructions displayed by the software.

## Instrument Shutdown

1. Pump the instrument with acid for **5 minutes** by choosing the location of the 3% HNO<sub>3</sub> and moving the sample needle "position"
2. Flush the sample introduction system for **5 minutes** with Q-water.
3. Flush the sample introduction system for **5 minutes** with Air.
4. Select the Analysis View and extinguish plasma by pressing the Plasma icon.
5. Exit the software  
\*The program will not shutdown unless the plasma has been turned off.
6. Turn off cooling water  
\*Do not turn off the cooling water before the plasma. This will cause a cooling error on the next run and could be possibly detrimental to the instrument.
7. Turn off Argon
8. Release pump tube clamps on **BOTH** the ICP pump and Autosampler pump.  
\*If the tubes are not unclamped then they become flatten and thus prove quickly ineffective. (To change these tubes see "ICP Cleaning and Repairs")
9. **Do not** turn off power to instrument.

## Weekly Shutdown Items

1. Remove OPI according to directions on page 36 of manual. REMOVE THE SAMPLER FROM THE OPI (CAUTION THE OPI HAS A \$400 MGF2 WINDOW THAT DISSOLVED IN WATER!!!) Clean the sampler in running water using a test tube brush.
2. Inspect the OPI lens and clean as described on page 38 if needed. Please see cautions in step 1.
3. Reassemble the OPI and return to instrument
4. Check the gas cleaning cartridge to ensure that the top end of the cartridge is still blue. Order a new cartridge when the cartridge is less than 25% blue.
5. Inspect pump tubing and replace every 16 hours of use.

## Monthly Shutdown Items

1. Check gas cleaning cartridge.
2. Check air filter
3. Check and clean torch box and nebulizer. Use acid to clean torch and spray chambers. Do not clean nebulizers in acid. The epoxy used in assembly is not stable in acid.

## Changing the pump tubes

1. Check to see if the tubes need to be changed by twisting them. If they are fine then the twist will appear uniform; if not, the place where the tube has been flattened will be visibly twisted.
2. Find the two new tubes, one with two orange ends and one with a green end and blue end.
3. First take the tube with the orange ends and remove it from the instrument by detaching it from the teflon tubes.
4. Replace the tube with the new one by inserting the teflon tubes into either end of the new tube. If the teflon is too slippery hold it with a paper towel.
5. Repeat the last step with the second tube.
6. Make sure that both tubes are running in the correct direction with the pump.

## Installing New Nebulizer or Spray Chamber

Each new nebulizer and spray chamber need their own iCal reference file.

1. Run the instrument using a calibrated spray chamber and nebulizer and run an iCalization.
2. Install new nebulizer and spray chamber.
3. In the system menus create a new ICAL reference spectra from an existing ICAL reference spectra.
4. Add this new ICAL reference to your methods file.

## Repairs

1. Check with Chuck or Whitney with ICP problems
2. Record the problem in the instrument log
3. If service is required complete the attached [Field Service Request Form](#).