

Hazards associated with purging the gas system and how to mitigate them

Do not enter the gas shack if the rotating red light at the entrance is on. This warns of an oxygen deficiency.

In General the Gas Mixing shack can be a hazardous place – BE AWARE OF YOUR ENVIRONMENT..

There are hazardous gas detectors that will cut off any gas flow at 10% of the lower explosive limit and oxygen deficiency monitors that will alarm if there is a less than 19% oxygen level.

Gas bottles are a hazard to move. Breaking the stem on a gas bottle can cause flying debris

Never move a bottle without the cap fastened. Always earthquake brace bottles at two points in the place they are to be used or stored. Always keep control of the bottle with two hands while moving.

The gases used in the calibration routine present a cryogenic hazard.

Be certain that the bottle is plumbed into the correct gas circuit and the fittings are tight before opening. When removing a bottle be certain to valve off the gas; At the bottle first, at the gas panel second. Slowly bleed the lines before disconnecting.

There is a marked step up both on to the gas pad and into the gas shack.

Be aware. It easy to trip while making a step into empty space when coming out of either one.

Side of racks must be removed.

To access some of the valves the side of the rack should be removed. This can fall rapidly and cause alarm or an injury. The rack side panel should be supported by one hand while turning the locking screw. Two hands should be used to lift and carry the side panel out of the way.

Transition from Rest (Helium) to Rest (He:Isobutane)

Name: _____

Date: _____ Time: _____

- Check (using Epics) that O₂ concentration less than 1000 ppm at Output gas Sampling Point.
- Also, Check that “O₂ Not Present” input to nanoautomate is green. *If alarm is red (oxygen present), the system must first be purged with helium using “Transition from Rest (O₂ Present) to Rest (Helium)” checklist.*
- Select Rest mode.
- Open isobutane Orifice (10 l/min) on the outside panel.
- Open VVM-36 (He orifice bypass)
- Open VVM-33 (isobutane orifice bypass)
- Close VVM-45 (circulation loop)
- Open VVM_46 (exhaust)
- Open VVM-101.
- Turn on heater.
- Close VVM-44
- Increase exhaust purge N₂ flow to 300 l/min
- Initial high-rate flush using rotameters and two recirculation pumps.*
- Open VVM-88 and VVM-87. Note which is already open _____.
- Set all mass flowmeters to Zero, except circulation flowmeter (set to 8 lt/min.)
- Switch on both compressor regulators. Note which is already on _____.
- Set controller you just turned on to MANUAL, 30%. (adjust later).
- Open Helium hi-flow rotameter one turn
- Open Isobutane hi-flow rotameter one turn
- Decrease BPR-1 to minimum(CCW).
- IN the Mode panel, activate super user mode
- In the valve panel, select VME mode, open VVPC-2, VVPC-3, VVPC-4, VVPC-6, VVPC-7 and VVPC-8, close VVPC-11.
- Start compressors
- Select “fresh gas” sample point
- Adjust helium and isobutane flows to get flow of approximately 24 l/min and 6 l/min respectively with the correct mixture. *(It takes approximately 4 hours per volume change at this rate.)*
- Adjust manual pump controller so that the automatic controller is 50-80%.

- ❑ Adjust helium and isobutane regulators to 1480 mbar and 800 mbar respectively.
- ❑ Monitor mixture using “Output Gas” sample point.
- ❑ *Flush for 4–6 hours (till Isobutane Concentration ~ 19%). Finally flush using mass flowmeters.*
- ❑ Select Rest mode.
- ❑ Close helium rotameter
- ❑ Close isobutane rotameter
- ❑ Turn off controller you previously turned on(see above).
- ❑ Turn off VVM-87 or 88, whichever you previously opened.
- ❑ Set Helium High-flow mass flowmeter to 8 lt/min (for 80:20 mixture)
- ❑ Set Isobutane Hi-flow mass flowmeter to 1.99 lt/min. (for 80:20 mixture)
- ❑ Set “circulation mix” mass flowmeter to 4 lt/min.
- ❑ Select VME mode
- ❑ Open VVPC-3, 4, 6, 7, 8
- ❑ Start compressor (should be on automatic).
- ❑ Adjust flows and circulation flowmeter as necessary to maintain circulation pressure.
- ❑ Change sampling point to output gas.
- ❑ Flush until “Output” gas mixture is approximately 19.5% isobutane.
- ❑ *When finished stabilizing gas mixture:*
- ❑ Choose REST mode using the switch on Electrical Front Panel.
- ❑ Set Helium mass flowmeter to 0
- ❑ Set isobutane mass flowmeter to 0
- ❑ Set circulation mass flowmeter to 0
- ❑ Open VVM_45
- ❑ Close VVM_46.
- ❑ Close VVM-33
- ❑ Close VVM-36
- ❑ Close Isobutane Orifice outside.
- ❑ Decrease He input pressure to 1000 mbar
- ❑ Reduce N₂ flow to 100 l/min
- ❑ *You should now proceed to Running Mode. The helium security line will modify the mixture in Rest Mode.*