Vacuum Atmospheres (VAC) Glovebox

Standard Operating Procedure (SOP)

Ragauskas Group 2010
VAC HE-493

- Glovebox: Vacuum atmospheres HE-493
- Picture is showing the glovebox with vacuum pump, controller, purifier and air lock
OVERVIEW

- Views, parts
- Sample/equipment load/unload
- Manual
- Purifier regeneration
- Vacuum pump oil changes
- Creating inert atmospheres
- Contacts
SIDE VIEW

- Pressure controller
- UHP N₂ tank
- Glovebox
- Airlock
- Vacuum pump
FRONT VIEW

- Purifier
- Pressure controller
- Glovebox
- Airlock
- Vacuum pump
LOAD/UNLOAD

- Turn on vacuum pump
- Make sure gate between airlock and glovebox is closed (inner door)
- Put samples/equipment in through “outer” airlock door
- Close outer door and evacuate by opening “EVACUATION VALVE C” and leave it for 1h
- Close evacuation valve and open “REFILL VALVE D” let the pressure go back to normal by refilling with N₂ from the glovebox
- Repeat the previous steps two more times
- After the third refill reach into the box (details on next page) and open the inner door
- Samples can now be unloaded into the glovebox, sliding tray makes this easier
- To get samples/equipment out load them on tray, close inner door TIGHT then outer door can be opened for unloading. Make sure the inner door and refill valve D are closed!
GET INTO GLOVES

- Always wear lab-gloves and lab-coat to make getting into glovebox gloves easier and to avoid sweating into them.
- First increase pressure in gloves with footpedal connected to pressure controller (easier to place in fingers).
- Then as pushing into the box release pressure continuously.
- When inside reach upwards to get on gloves fully.
The manual is always next to the glovebox

**Section 2.1. “Read all instructions through before beginning.”**

Always consult the manual and SOP first then see Matyas Kosa, Tyrone Wells or Marcus Foston before beginning (or other currently trained users)

Maintenance is really important as well as cleaning after use to avoid crosscontaminations
PURIFIER REGENERATION

- **CONSULT MANUAL!**
  - Close valve A so circulation stops
  - Close valve B
  - Open purge valve outlet under purifier
  - Start purge gas flow (<5% H₂ in N₂)
  - Set gasflow to ~20 L min⁻¹ with cylinder valves and flowmeter

- Turn controller knob to start and turn switch to regenerate
- Vacuum must be on for at least 1 h (usually overnight)
- Place a beaker under purge gas outlet to collect moisture
- At the end turn off regeneration switch, stop gas flow then reopen A and B
VACUUM PUMP OIL CHANGE

- Prepare paper towels, funnels and beakers
- Open top screw, place beaker under bottom screw and release old oil
- Rescrew bottom screw and fill with new vacuum pump oil up between the indicator signs
- Rescrew top screw and let run for few seconds
- Repeat these changes until oil is clean
- Do the final fill
- Dispose old oil appropriately!
INERT ATMOSPHERE

- To establish inert atmosphere please consult the manual section 3.5 on page 3-10

- BRIEFLY:
  - Purge with continuous N₂ flow
  - Regenerate purifier
  - Change pump oil
  - Repeat until necessary

- Minimal O₂ and H₂O levels can be close to 1 ppm
WHEN USING

- Always wear proper protective clothing
- Always use airlock as described to avoid moisture and oxygen “contamination”
- Don’t leave opened high moisture content samples inside for the above reason
- NEVER PUT OPENED SOLVENT CONTAINING BOTTLES IN AIRLOCK SINCE THE PUMP DOESN’T HAVE A COLDTRAP
- NEVER USE INORGANIC ACIDS INSIDE, THEY CAN POISON THE PURIFIER!
- Purifier has to be regenerated and pump oil changed once every month.
PART REORDER

- UHP N\textsubscript{2} and purifier purging gases from Airgas
- Gloves from Vacuum Atmospheres [www.vac-atm.com](http://www.vac-atm.com)
- When running out of nitrogen shut down the system and restart when new cylinder is in place, purge for a few hours then regenerate.