

# STANDARD OPERATING PROCEDURES for GLOVE BOX



The Omni-Lab Glove Box is used for battery assembly. It is filled with argon gas. Materials move in and out through the chambers which located on the right side of the box, the oxygen sensor is located on the right top of the box.

The Omni-Lab Glove Box is dedicated only for battery assembly. It is filled with argon gas. All materials transferring into glove box must be pre-approved by Lab staff. When you transfer electrodes, you **have to** use the **smaller chamber** of the two antechambers located on the right side of the tool. If you need to use the **bigger one**, you have to ask lab member permission.

The O<sub>2</sub> and H<sub>2</sub>O concentration in glove box is are normally less than 0.5 ppm. **Please inform lab member if concentration is higher than 0.5ppm.**

Users have to bring their own electrodes, coin cell parts. The vacuum oven kept at 105 C near the glove box is dedicated for drying electrodes before transferring into the glove box (overnight drying is recommended). If you use our coin cell parts and electrolytes for battery assembly, you have to pay. **The coin cell parts and electrolyte are free only if you are collaborating with our group.** Below is the information for coin cell parts and electrolytes in the glove box.

- Standard coin cell R2032 cases
- Lithium foil (99.9%, Alfa Aecar )
- Sodium ingot (99.9%, Sigma-Aldrich)
- Separator (Celgard 3501)
- Electrolytes (1M LiPF<sub>6</sub> in carbonate/diethylcarbonate (EC/DEC, 1:1), 1 M NaClO<sub>4</sub> in EC/DMC as well as other electrolytes (please ask lab member))

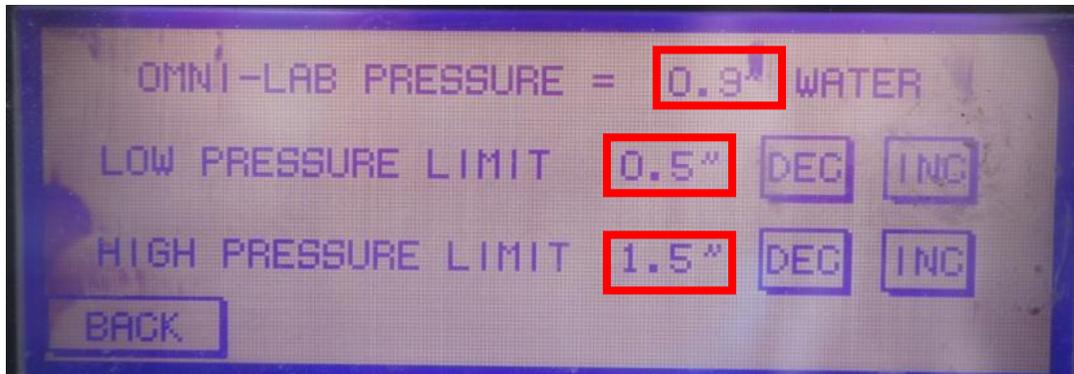
Before using the glove box, all users must **get permission from the lab director and get trained by lab member.** **All chemicals are specifically prohibited** in the glove box except being approved by the lab director or lab member. **If a user contaminates the glove box by not following procedures, the glove box must be fully purged and refilled with Argon at the user's expense. This cost may exceed \$500 and the unit could be down for six weeks or more.** All uses must follow the operating procedures described below.



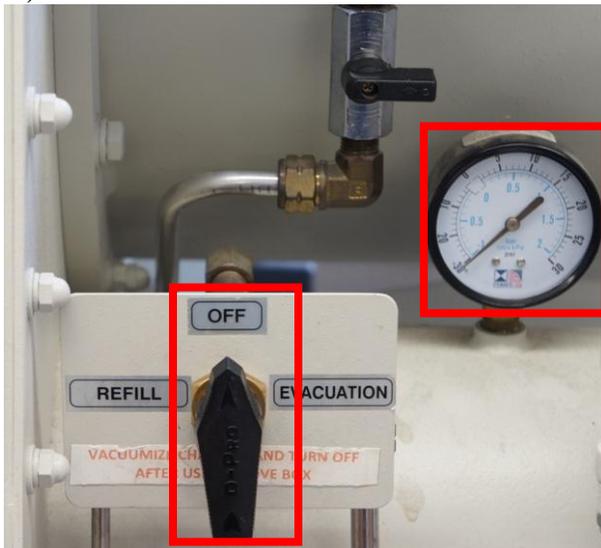
► The O<sub>2</sub> concentration should always be less than 1.0 ppm, please inform lab member if higher than 1.0 ppm.

## Initial System Status Check

- A) Please inform Lab member if you are external person.
- B) All doors should be closed.
- C) Check the Ar pressure, please inform lab member if lower than 500 psi.
- D) Check the Touch Panel, the Omni-Lab Pressure should be higher than 0.0 water, between Low Pressure Limit 0.5" and High Pressure Limit 1.5"(or 2.0").



- E) All Chambers should be in vacuum condition and valves are off.



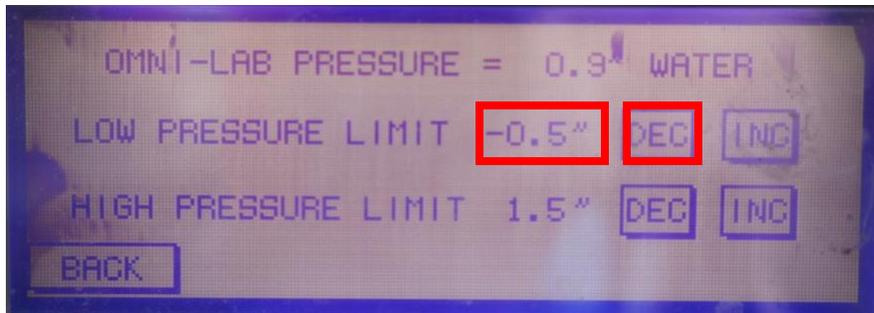


► **Materials must be dried in the vacuum oven at 100°C or higher temperature overnight to remove the O<sub>2</sub> and H<sub>2</sub>O before moving into box.**

► **Chemicals or stuff other than electrodes is prohibited except permitted by lab member**

### **Transferring electrodes from outside into box**

1. Turn valve to Refill, fill the chamber completely, and then turn to OFF.
2. Open the outer door, load your electrodes into the chamber.
3. Close the outer door, **fully evacuate and refill** the chamber completely 3 times.
4. After chamber is refilled completely, turn valve to OFF.
5. Decrease the **Low Pressure Limit** to 0".



6. Put on the gloves, use the left DEC or right INC button of the Footswitch to control the pressure.
7. Open the inner door, move your electrodes into glove box.
8. Close the inner door, start operation inside the glove box .

### **Transferring coin cells from inside to outside of glove box**

1. Fully refill and evacuate the chamber three times except that you are really sure **THE CHAMBER IS NOT USED BY OTHERS DURING**

**YOUR OPERATION. AT ANY TIME, PLEASE DO NOT ASSUME THE INNER DOOR IS READY TO OPEN.**

2. Open the inner door and move your batteries into the chamber.
3. Close the inner door.
4. Get off the gloves, increase the Low Pressure Limit to 0.5".
5. Open the outer door and remove your batteries. **PLEASE DOUBLE CHECK TO MAKE SURE THE INNER DOOR IS CLOSED.**
6. Close the outer door, evacuate the chamber completely and turn the valve to OFF.

Notice:

▶ **The glove box is a delicate tool, if you find or get any leakage of the box or hole in the gloves, please inform lab members immediately and help them seal the leakage first.**

▶ **Please keep the inside of the box and the gloves clean and keep everything inside in order.**

▶ **After finishing use the glove box, remember to remove the trash you create together with your batteries.**

▶ **If you need to store your electrodes in the box, you must ask for permission from lab members.**

▶ **Do not take out lithium or sodium metal. They are very sensitive to oxygen and cause fire.**

	<div style="background-color: yellow; text-align: center; padding: 5px;">  <b>CAUTION</b> </div> <p>Risk of damage!</p> <ul style="list-style-type: none"> <li>▶ An evacuated antechamber cannot be opened. The attempt to open a door of an evacuated antechamber may damage the door locking mechanism.</li> <li>▶ Never open inner and outer antechamber doors simultaneously and</li> <li>▶ Never open the inner door of an antechamber filled with ambient atmosphere.</li> </ul> <p>This would result in pollution of the box atmosphere and possibly in damage of measuring instruments and material within the box.</p>
	<p>Risk of damage to process materials!</p> <ul style="list-style-type: none"> <li>▶ Ensure that both outer and inner doors of the antechamber are closed when material is not being transferred through the antechamber.</li> <li>▶ After having the outer antechamber door opened, it is recommended that at least one evacuation and refill cycle is completed for the antechamber to prevent possible condensation of moisture on the interior antechamber walls.</li> </ul>

 	<div style="background-color: yellow; text-align: center; padding: 5px;">  <b>CAUTION</b> </div> <p>Risk of damage!</p> <p>Opening of transfer containers inside the glove box that still contain enclosed air will lead to contamination of the glove box atmosphere. If you transfer material with enclosed gaseous volume into the glove box the packaging used for transportation should be able to withstand the pressure difference during the antechamber purge process (evacuation and refilling cycles).</p> <ul style="list-style-type: none"> <li>▶ <i>Refer to section 2.6.6</i> for general remarks concerning the handling of chemicals and gases.</li> <li>▶ If possible open up any seals to enclosed gaseous volume – e.g. lids of bottles – so that the enclosed gases will also be exchanged during the pump/fill cycle.</li> <li>▶ If you transfer liquids or solvents into the glove box do not evacuate the antechamber below their vapour pressure at the given temperature.</li> </ul>
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