Edwards Evaporator Operating Instructions

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The following items should be checked before using the Edwards Evaporator:

- Is the system free?
  Check the logbook to see if someone is currently pumping the system down.
- Do your samples come from a reasonably clean process?
  Check the master to see whether the Edwards can survive your clean process.
- Are you performing Aluminum evaporation?
  The Edwards evaporator is only eligible to Aluminum evaporation.

❖ Normal Operation Procedures(For General Users):

1. Opening Chamber for Sample Loading

a. Turn off the ion gauge.
b. Close the high vacuum valve. You should hear a loud knocking sound as the valve closes.
c. Open the valve on nitrogen line.
d. Switch on the "VENT" valve. Wait for the bell jar to lift off the base plate.
e. Switch off the "VENT" valve. Close the nitrogen valve.
f. Switch the hoist switch to the highest position to lift the bell jar up.

2. Load the Source and the Samples

a. If the existing boat looks worn out, change it. You might regret the fact you did not change it. If it needs to be "pre-fired", then do it. Again, it may save the effort you put into your sample already.
b. Load Aluminum blocks into the boat.
c. Load samples to the dents.

Note: Try not to contaminate the chamber. This is important to the folks who will use the chamber after you. Also, do not leave the chamber open to the atmosphere for prolonged periods of time.

3. Pumping the Chamber Down

a. Use wipes to clean the sealing ring area, making good seal.
b. Switch the hoist switch to the lowest position to close the chamber, and switch it to the middle position.
c. Turn on the roughing pump.
d. Wait until the chamber pressure reads 10mTorr.
e. Turn off the roughing valve and turn on the "HI-VAC" switch. When the pressure gets to E-7 mbar range, the system is ready for evaporation. It will take at least 4 hours to get to this range.

4. Evaporation

a. Make sure that the ion gauge is **on**, the shutter is **off**, and the chamber pressure is in the range of 1E-7 mbar.

b. Turn on the evaporation power supply. Increase the current slowly, no faster than 1A/30secs. When the current is higher than 9A, keep an eye on the Aluminum block in the boat.

c. Normally the Aluminum block will melt around 10.5A. The chamber pressure will increase into E-6 mbar range. Keep the current lower than 12A.

d. When the pressure is stabilized, open the thickness monitor; open the shutter; adjust the evaporation rate by changing current. Do remember NOT to give a current larger than 12A.

e. After the required thickness is achieved, close the shutter; lower the current slowly to zero, no faster than 1A/30secs. Turn off the evaporation power supply.

5. Cooling

It takes approximately half an hour to cool the chamber down to a safe temperature.

6. Log out

Make sure that you log out, so the later person understands that you are done.

❖ Pre-fire Procedures (For General Users):

1. Opening Chamber for Sample Loading

a. Turn off the ion gauge.
b. Close the high vacuum valve. You should hear a loud knocking sound as the valve closes.
c. Open the valve on nitrogen line.
d. Switch on the "VENT" valve. Wait for the bell jar to lift off the base plate.
e. Switch off the "VENT" valve. Close the nitrogen valve.
f. Switch the hoist switch to the highest position to lift the bell jar up.

2. Load the New Crucible and/or Boat

Note: Try not to contaminate the chamber. This is important to the folks who will use the chamber after you. Also, do not leave the chamber open to the atmosphere for prolonged periods of time.

3. Pumping the Chamber Down

a. Use wipes to clean the sealing ring area, making good seal.
b. Switch the hoist switch to the lowest position to close the chamber, and switch it to the middle position.
c. Turn on the roughing pump.
d. Wait until the chamber pressure reads 10mTorr.
e. Turn off the roughing valve and turn on the "HI-VAC" switch. When the pressure gets to E-7mbar range, the system is ready for pre-fire. It will take at least 4 hours to get to this range.

4. Pre-fire

a. Make sure that the ion gauge is **on**, the shutter is **off**, and the chamber pressure is in the range of 1E-7 mbar.
b. Turn on the evaporation power supply. Increase the current slowly, no faster than 1A/30secs. Stabilize the current at 12.5A. Normally the chamber pressure will be increased. Keep the current for 10 minutes. If the chamber pressure is much higher than E-5 mbar range. Another Pre-fire is necessary.
c. Reduce the current slowly to zero, no faster than 1A/30secs. Turn off the power supply.

5. Cooling

It takes approximately half an hour to cool the chamber down to a safe temperature.

6. Log out

Make sure that you log out, so the later person understands that you are done.

❖ Regeneration Procedures (For Authorized Users):

1. Close both roughing pump valve and high vacuum valve.
2. Turn off cryo pump cool head
3. Open nitrogen regeneration, purge with nitrogen for about 4 hours.
4. Close nitrogen regeneration valve.
5. Hook up portable T.C. gauge located on cryo pump.
6. Open regeneration valve.
7. Pump cryo pump out to 40 microns or better.
8. Close regeneration valve.
9. Repeat steps 3-8 at least once.
10. Watch T.C. gauge reading. Pressure should not rise more than 10 microns in 3 minutes.
11. Repeat 6-10 until 10 is satisfied.
12. Make sure regeneration valve is closed.
13. Turn on the cryo pump cold head.
14. Wait for hydrogen vapor bulb gauge to read less than 20 K. This will take about 5 hours.
15. System is ready for use.

❖ Potential Hazardous Factors:

1. High vacuum might cause implosion.
2. High working current, high working temperature might cause shortage problem.
3. Mechanical movement of heavy bell jar might cause physical damage to operators.