**Kauffman eH 200 hollow cathode operating procedures:**

-Turn off ion pump. Chamber should be in low 10-7 torr.

-Turn on KRI Auto controller, Discharge controller, and Filament controller

-Open the gas flow from cylinder to the gas flow controller (/electronic regulator (black box))

-Press Enable on the KRI auto controller

--Gas adjust knob ( 0 sccm= closed; 1 sccm = sometimes gas flow on/off) – adjust to desired pressure in chamber

---Gas flow can go to a maximum to 21 sccm

---Green light = gas flowing -> actual flow (10 sccm = good number)

--When gas is released 10-3 torr (this is a high-pressure application).

--when you turn the knob this will allow you to establish the set point and after a few seconds the valve will open/adjust to get to set point. Its red if not at set point and green if at set point.

- Press the enable button on the discharge controller.

--Discharge system \***max Power = 300 Watts**\*

If you go over this max power this can damage the magnet (gets too hot and breaks)

--Good starting point is 150 V at 1.0 Amps (150 Watts) (slowly increase current control)

-Press the enable button on the filament controller

-adjust cathode emission (filament until the cathode meter reads 1.0-1.8 Amps)

-Increase gas flow on the KRI Auto controller to 6.9 sccm, set discharge controller: voltage to 62 V and current to 1.98 Amps

If you turn down the voltage on the discharge controller, emission will drop because nothing gets excited.

**Shut down procedures**

-Slowly turn down the filament controller down to 1.0 A.

-Slowly turn down the discharge controller down to 1.0 A.

--plasma increases voltage which could make the Kaufman ion source break

-Close the nupro valve (. (big twisty knob/gas knob)

-Cut gas flow to 5.0 sccm

-Hit the standby button then close gas flow controller

-Turn off the KRI auto controller, discharge controller, and filament controller; close the gas chamber knob on the chamber, and finger tighten the regulator to close (on the gas canister)

**Pumping down procedures:**

Turn on mechanical pump and turbo pump. Once we reach low 7’s.

Make sure that the Nupro is cut off from the Argon gas line. (big twisty knob)

Then turn on auto controller and leak a bit of the air from the gas flow controller (/electronic regulator (black box)) into the chamber (about 10-20 sccm) . Once pressure stabilizes in the 10 low 7’s then turn on ion pump.

**Side note:**

-Kaufman filaments last about 10 – 30 hours. (we have some replacement filaments.)

--can operate up to 4.0 Amps of emission current.

-If using Argon atoms – chamber can glow blue from Argon ions (Ar+ and Ar 2+)

-When you turn on the emission filament controller the blue light will brighten

-Chamber can get hot (30 mins run approx 45 oC ->60 oC damages human skin)

--Use a thermocouple to measure temperature on readout display

--Temperature at max gas flow 75 oC

-Depending on spectra the window, spectrometer, or fiber can limit the data. Window cuts off at 400 nm, fiber 200 nm, spectrometer 200 nm,

-Sometimes the auto controller will flash red (we don’t know reason but it can go back to normal)

-The emission controller should be relatively low power output, and the discharge

controller is the one typically around 100 - 200 Watts

* Sccm = standard cubic centimeters per minute

\*The important thing is to keep the gas flow high enough, otherwise the controller will draw too much power trying to sustain the discharge at lower pressures. The gas flow turn on is a bit of a step function, i.e. the gas flow at low pressures (near the cutoff of the flow controller) is somewhat unstable.

Ocean optics – copy and put in excel file, remove header row and save data.

-Sometimes Spectra does not show up on Ocean optics software – close and reopen the

software