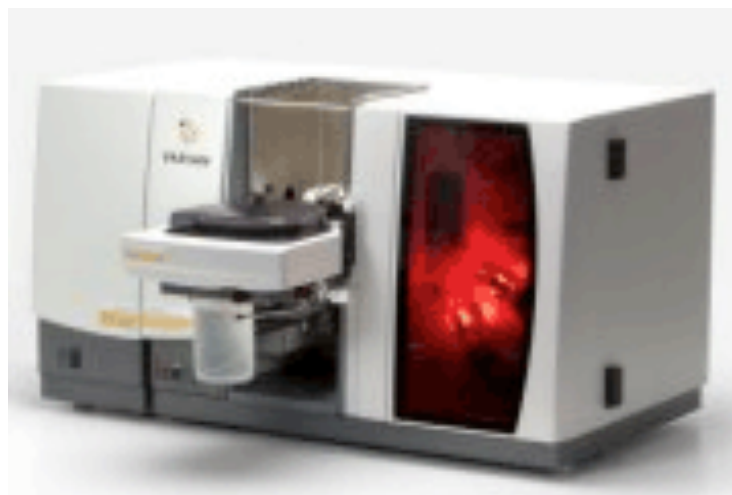
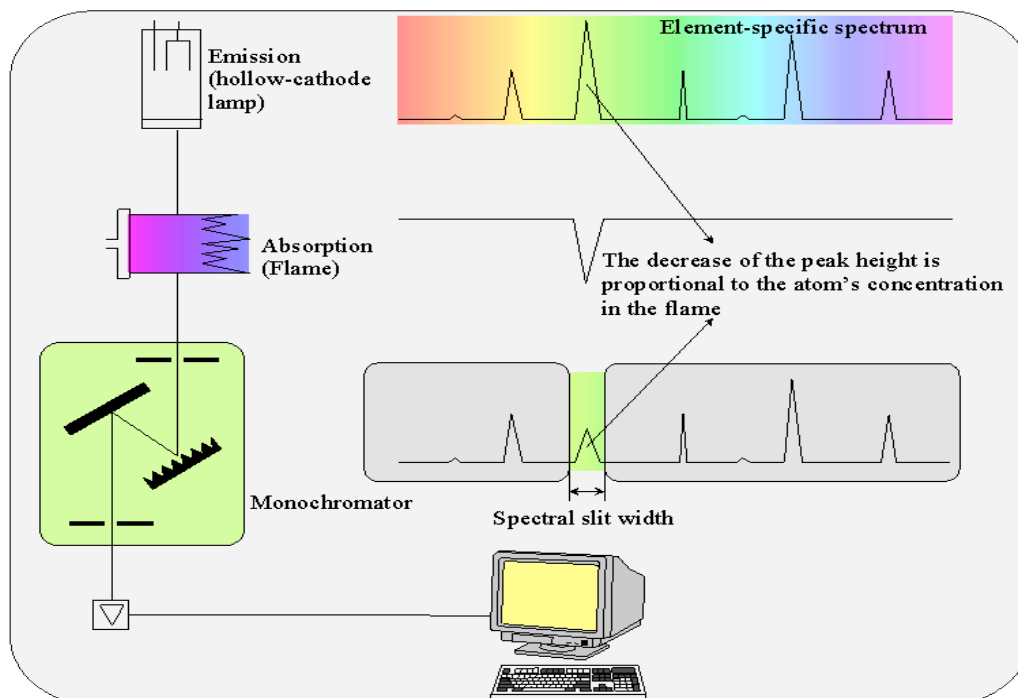


Using the Varian AA240 Atomic Absorption Spectrometer

Varian AA240 Operations

<http://www.varianinc.com/cgi-bin/nav?products/spectr/aa/s140240/s140240&cid=ILKLJLQHFQ>



Varian AA240 at Miramar College

Located in S5-209, Science Building, Miramar College



Preparing instrument for operation

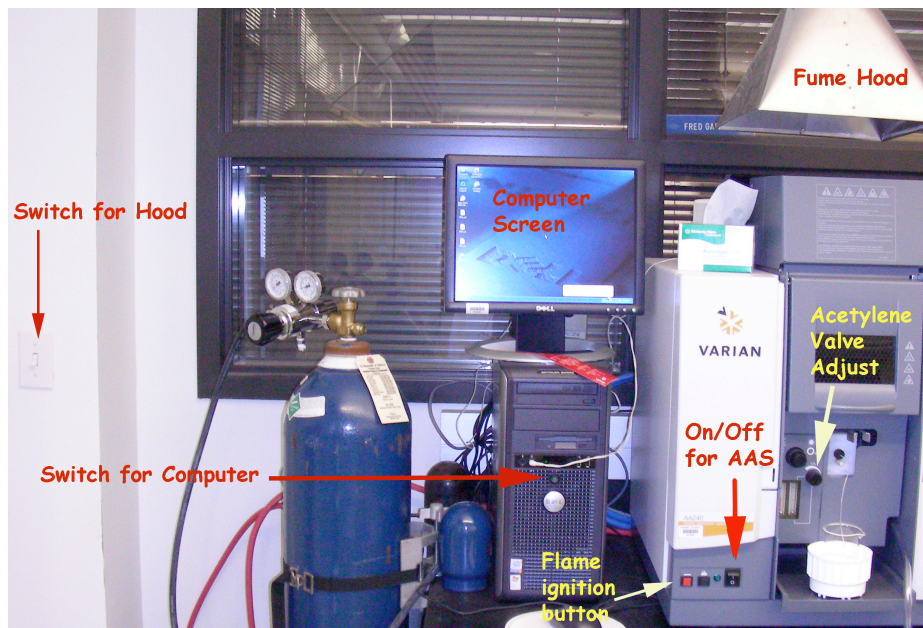
Flip the switch to turn on the fume hood above the spectrometer
Turn on the oxygen and acetylene gas cylinder

Check to make sure that the acetylene tank does not go below 400 psi
Acetylene pressure 2nd stage set for 75 psi
Oxygen pressure 2nd stage set for 40 psi



Turn on the AAS spectrometer by switching the power button, (bottom left corner of spectrometer)
When you turn on the spectrometer, wait a few seconds and listen for the "burp"
The burp from the instrument is an indicator that the instrument is positioning all setting to the zero point

Turn on the computer by pressing the power button of the CPU.



Opening screen using Windows XP

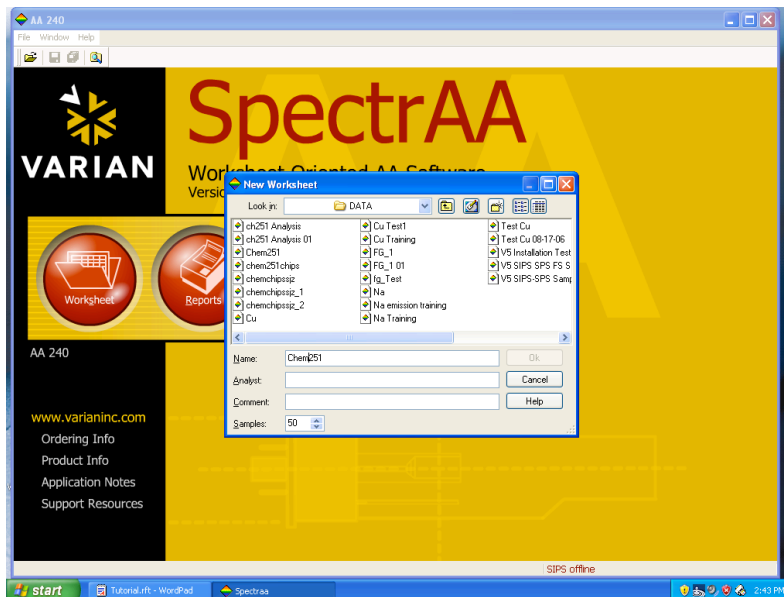
Click on **worksheet**



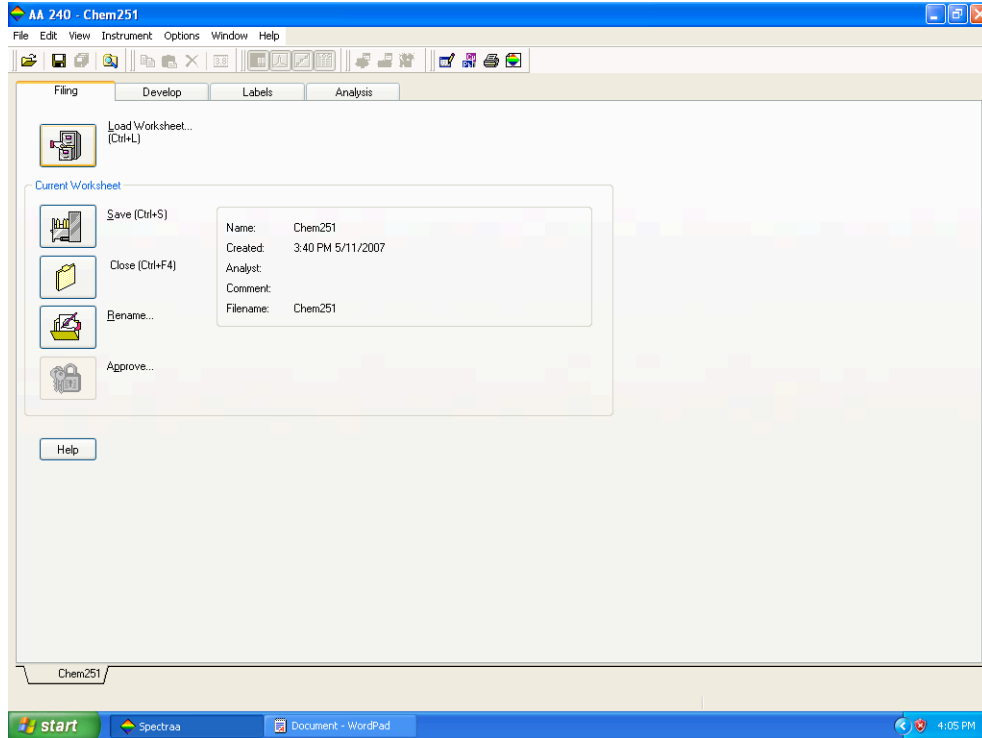
Click on worksheet (create new worksheet)

Click on New

Type in file name

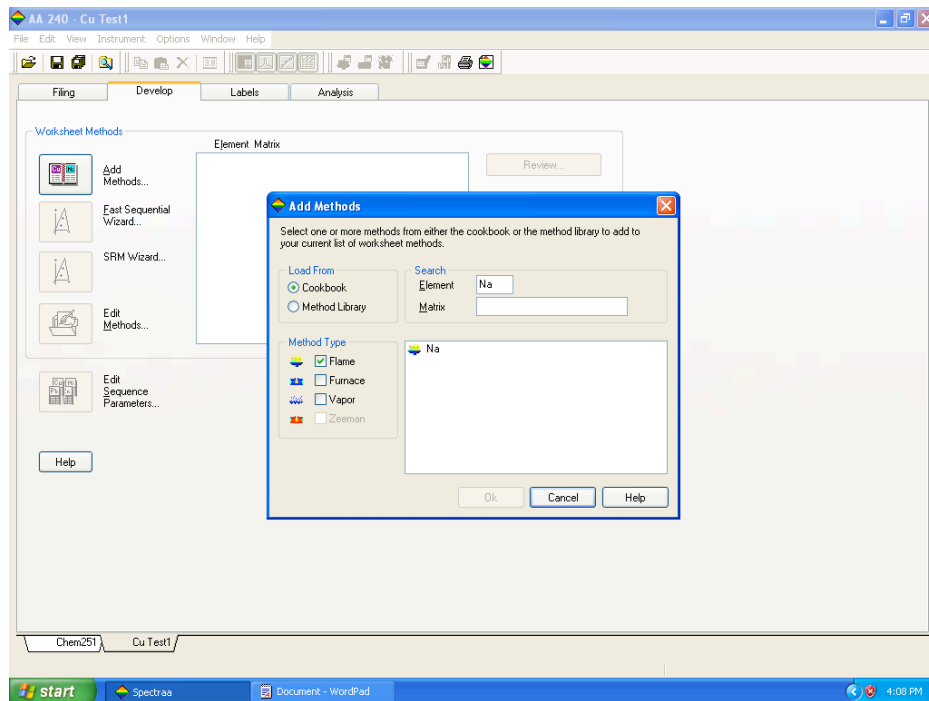


Opening menu after new worksheet is open
Note the menu - Filing - Develop - Labels - Analysis



Click on the Develop tab and choose add methods

Select Method Type -- Flame
Choose the Element - **Sodium, copper, calcium**

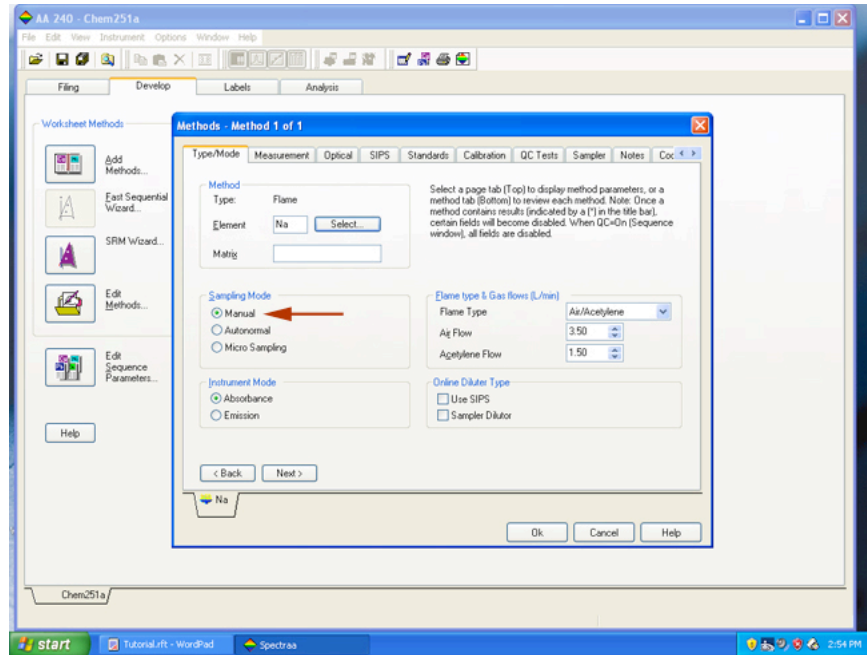


Click on the element (i.e., Na) to get Method menu for the element to be analyze

Double check that the element selected is under the Flame.

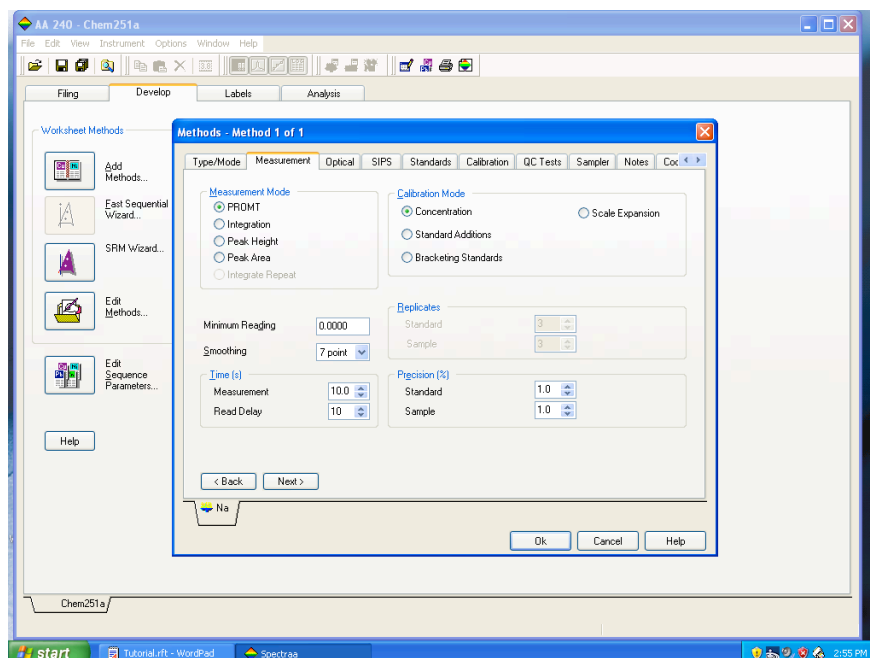
Choose under Sampling Mode: **Manual**

Choose Flame type: Acetylene with Air flow = 3.50 and Acetylene Flow = 1.50



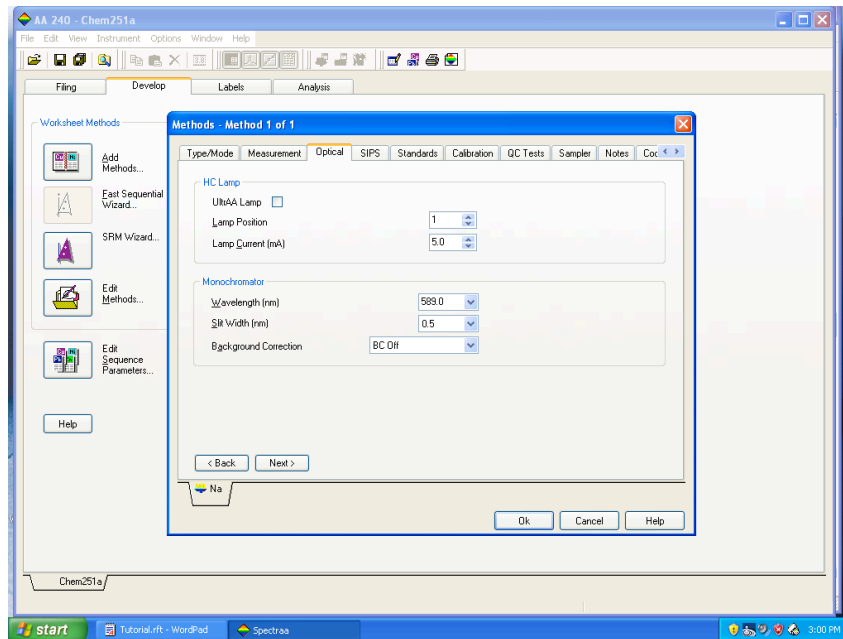
Click the measure tab

Select Measure mode: **integration**
Select Calculation mode: **Concentration**



Select Optical tab

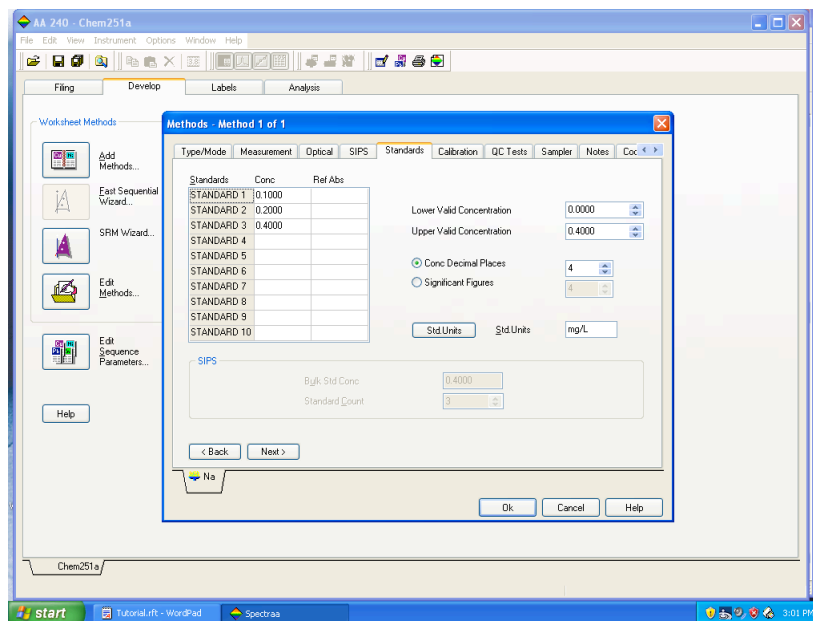
- The lamp position is set for the element selected
- The wavelength is set for the line max of the element source
- Click on optics, this will allow the selection of lamp and metal to be analyze
- Select the wavelength that will be used from the lamp



Skip the sips tab, the instrument does not have sips accessories.

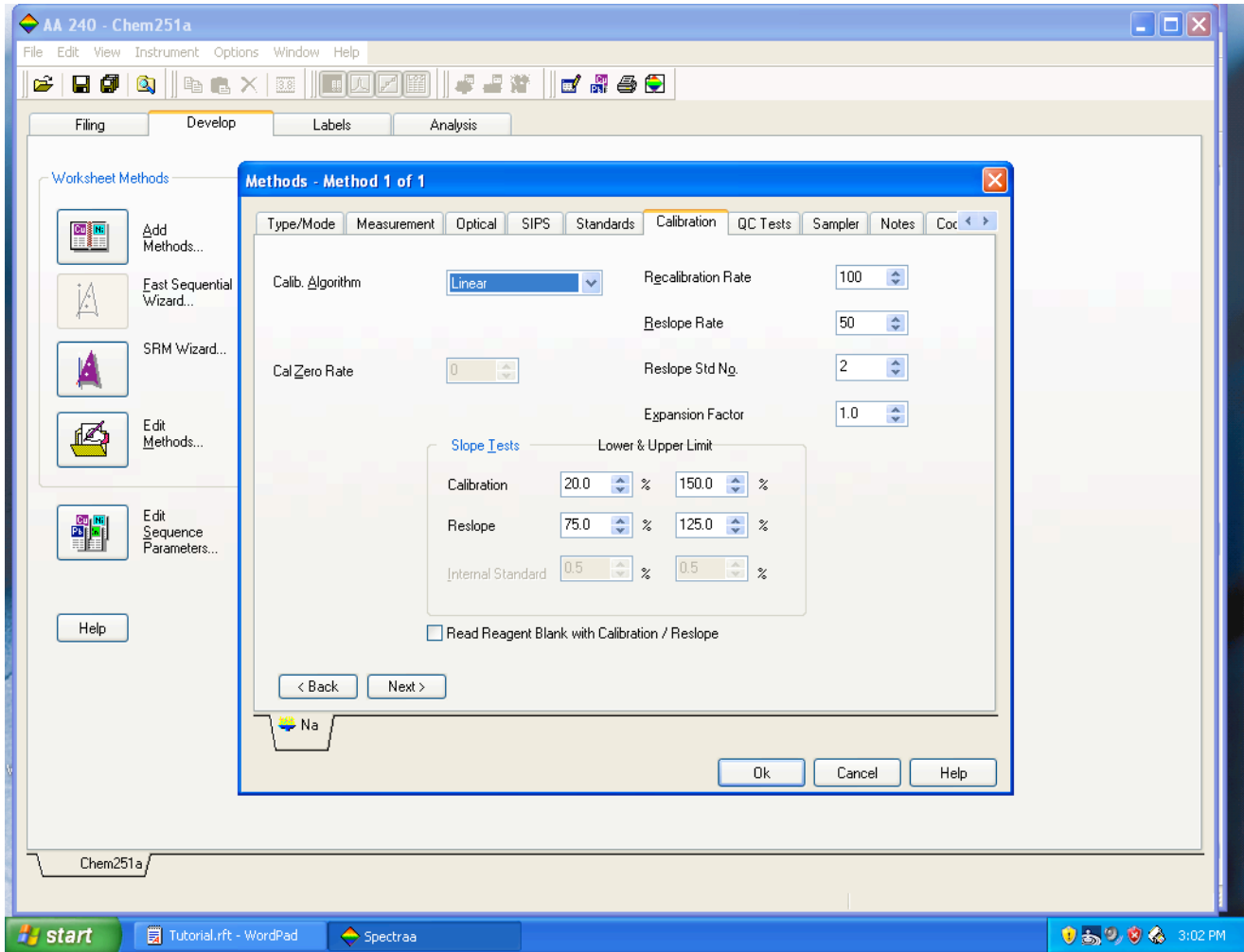
Select the standard tab

- These are the standards that will be analyze in a Beer-Lambert analysis
- Concentrations are entered and the units are assigned. (mg/L = ppm)



Click on the Calibration tab

Select the **Linear** (Beer-Lambert) Calibration algorithm



Skip the:
QC Tests
Sampler
Notes
Cookbook tab

Click OK

Click on labels tab

Label the sample to be analyze.
i.e., Na in snack #1, Na in snack #2 ...

The screenshot shows the 'Labels and Sample Prep' tab in the 'AA 240 - Chem251a' software. The main workspace contains a table with the following data:

Rows	Sample Labels	Sample Weights	Sample Volumes	S. D
1	Sample 001	1.0000	1.0000	1.0000
2	Sample 002	1.0000	1.0000	1.0000
3	Sample 003	1.0000	1.0000	1.0000
4	Sample 004	1.0000	1.0000	1.0000
5	Sample 005	1.0000	1.0000	1.0000
6	Sample 006	1.0000	1.0000	1.0000
7	Sample 007	1.0000	1.0000	1.0000
8	Sample 008	1.0000	1.0000	1.0000
9	Sample 009	1.0000	1.0000	1.0000
10	Sample 010	1.0000	1.0000	1.0000
11	Sample 011	1.0000	1.0000	1.0000
12	Sample 012	1.0000	1.0000	1.0000
13	Sample 013	1.0000	1.0000	1.0000
14	Sample 014	1.0000	1.0000	1.0000
15	Sample 015	1.0000	1.0000	1.0000
16	Sample 016	1.0000	1.0000	1.0000
17	Sample 017	1.0000	1.0000	1.0000
18	Sample 018	1.0000	1.0000	1.0000
19	Sample 019	1.0000	1.0000	1.0000
20	Sample 020	1.0000	1.0000	1.0000
21	Sample 021	1.0000	1.0000	1.0000
22	Sample 022	1.0000	1.0000	1.0000
23	Sample 023	1.0000	1.0000	1.0000
24	Sample 024	1.0000	1.0000	1.0000
25	Sample 025	1.0000	1.0000	1.0000
26	Sample 026	1.0000	1.0000	1.0000

On the left side of the workspace, there are several buttons: 'Import Labels...', 'Export Labels...', 'Setup Sampler Backs...', 'Setup PSD Carousels...', 'Loading Guide', and 'Help'. On the right side, there are buttons for 'Ins/Del Rows...', 'Auto Copy...', and 'Solution Type...'. Below these buttons, there are fields for 'Nominal Weight' (1.0000) and 'Nominal Volume' (1.0000), with an 'Edit Nominals...' button. At the bottom right, there are fields for 'Total Rows...' (50) and 'Result Rows:' (0).

Select the Analysis Tab to begin optimizing the flame and signal.

At this point the instrument should have already been turned on, if not, turn on the spectrometer (listen for the burp) and wait 1-2 min for instrument to warm up.

Click on Optimize (under the Select button) from the menu on the left.

Click on Optimize Lamp, and adjust the lamp (i.e, screws at the bottom of Na lamp) to maximize the signal (green bar).

If the signal max out, then click on rescale to lower the gain (S/N)

When the lamp signal is optimized, click on OK.

It is time to optimize the signal from the sample

The screenshot displays the 'AA 240 - Cu Test1' software interface. The 'Analysis' tab is selected, and the 'Flame Optimization' dialog box is open. The dialog box contains the following elements:

- Sampler Offline** status indicator.
- Goto Tube** section with 'Back' and 'Tube' dropdown menus set to '1', and a 'Goto Tube' button.
- Down height** set to 0 (mm).
- Key to tube colors**: Sample (blue), Calibration (red), Calibration/QC (green), Sample/QC (purple), Dilution (white), Not Assigned (black).
- Optimization: Lamp** section with a vertical green bar showing a signal of 0.940. Below the bar are buttons for 'Optimize Lamps', 'Optimize Signal', 'Rescale', and 'Inst Zero'. A 'Gain 35 %' label is present.
- Gas Flow (L/min)** section with 'Oxidant' and 'Acetylene' flow rates set to 10.00. Below are sliders for 'Oxidant' (set to 3.50) and 'Acetylene' (set to 1.50), and a 'Burner Height' of 13.5 mm.
- SIPS** section with 'Start Pump' and 'Stop Pump' buttons.
- Buttons**: 'Align Probe', 'Rinse', 'Stop rinse', 'Park', 'Prime Diluter', 'Ok', 'Cancel', and 'Help'.
- Sensitivity Check**: 1.5 mg/L gives about 0.2 Abs at 324.8 nm, A/A burner.
- Bottom Panel**: 'Cu' element, 'Method 1 of 1 Absorbance Integrate 5.0 s', 'Concentration Air/Acetylene', 'Lamp 1 Manual BC Off', 'Flow 4 of 50 Result rows: 0', 'Chem251', 'Cu Test1', 'start', 'Spectraa', 'Document - WordPad', and '4:14 PM'.

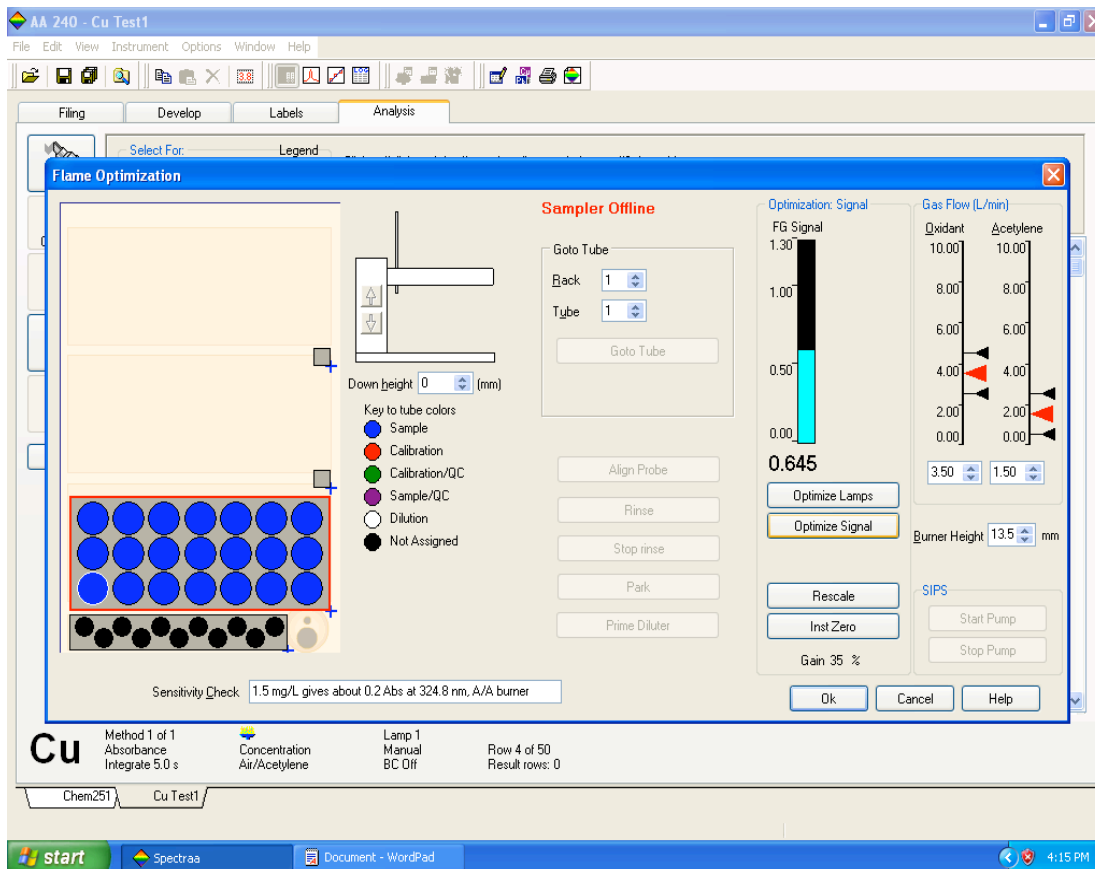
Optimize the signal.

Remove the capillary from the water sample and place into one of your standards.

Click on the Optimize signal button under the Optimize Lamp button.

A turquoise bar should display. Optimize this signal to about 0.6.
You may have to adjust the flow rate (brown knob beneath the capillary inlet to instrument)
As well as adjust the flame and angle of nebulizer

When the signal is optimize, click on OK



The menu will return to the element , click on cancel.
This will take you out of optimize mode.

Under Analyze

Click on select

Select the standards and samples to be analyze, with the marker pointer.
Be sure that all others are not highlighted in maroon.

You are now ready to run the standards and then the samples.

Click on start

The instrument will run a zero and then prompt for the standards.

Wait for the instrument instructions before you place then next sample under the capillary that feeds to the nebulizer

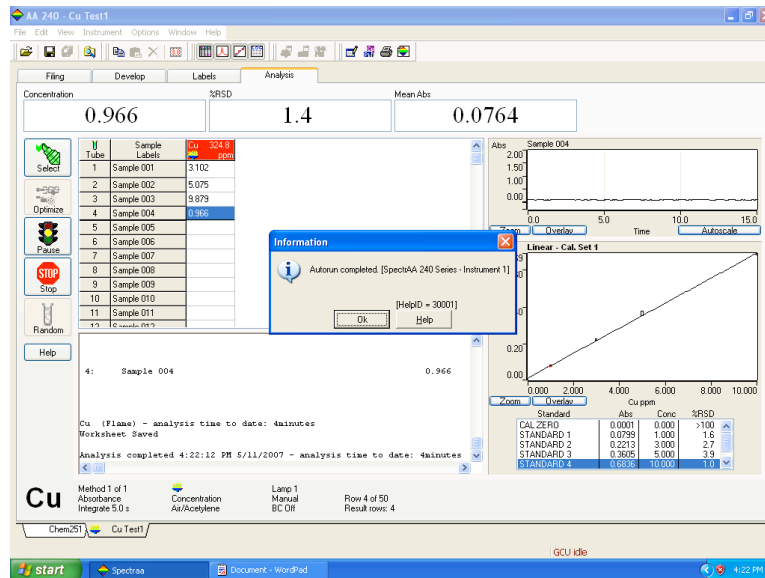
The screenshot displays the 'AA 240 - Cu Test1' software interface. At the top, the 'Analysis' tab is active, showing 'Concentration' (1.000), '%RSD' (0.9), and 'Mean Abs' (0.0806). A table lists 11 samples, with Sample 001 highlighted in maroon. The interface includes control buttons for 'Select', 'Optimize', 'Pause', 'Stop', and 'Random'. A 'Burner Height: 0.0 mm' and 'Instrument Zero' status are shown. A calibration graph titled 'Linear - Cal. Set 1' plots Absorbance (Abs) against Concentration (Cu ppm), showing a linear relationship. A data table below the graph lists standards and their corresponding Abs, Conc, and %RSD values.

Standard	Abs	Conc	%RSD
CAL ZERO	0.0001	0.000	>100
STANDARD 1	0.0806	1.000	0.9
STANDARD 2		3.000	
STANDARD 3		5.000	
STANDARD 4		10.000	

Method 1 of 1
Absorbance Integrate 5.0 s
Concentration Air/Acetylene
Lamp 1 Manual BC Off
Autotune in progress. STANDARD 1, Replicate 3/3
Collecting Cu replicate 3

Instrument will ask for standards and samples and do a Beer's Lambert Calculation

When experiment is complete, the flame will be extinguish by the instrument



Print results

Allow instrument to cool down for 15 minutes then turn off AA instrument

Turn off AA spectrometer

Turn off gas

Turn off computer.