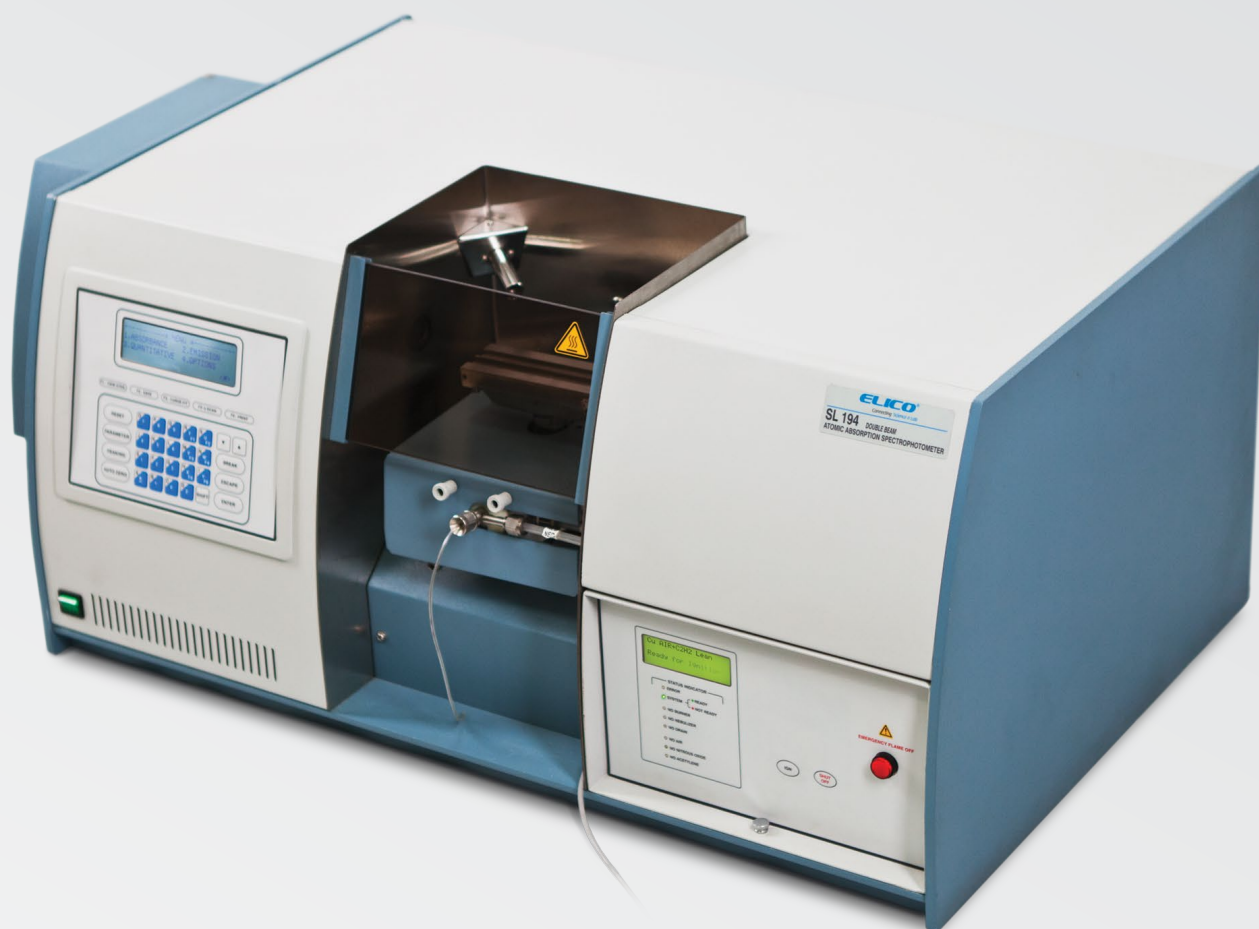


SL 194

PRODUCT SPECIFICATION SHEET

True Double Beam Atomic Absorption Spectrophotometer





An industry trailblazer for **seven decades**, stands as the
vanguard in India's Analytical Instrumentation sector.

Elico's genesis in the year 1960, laid the foundation for the Analytical Instrumentation Industry in India. As a pioneer, the leading Analytical Instruments Design and Manufacturing company is having headquarter in Hyderabad, Telangana and serves customers both domestically and internationally.

VISION & FUTURE

ELICO's vision is to provide **'Smart Analytical Instrument Solutions'** to users worldwide requiring Chemical & Biological Analysis that would enhance their competitiveness and enable them to comply with Regulatory & Statutory requirements thereby contributing to a Healthier and Sustainable Environment.

OVERVIEW

Corporate vision at Elico has evolved over the years, into becoming a 'Globally-renowned Smart Analytical Solutions Provider.' The company's current focus is to assist customers by providing holistic solutions that is based on our application specific instruments and services. This has not only created an inherent long-term value for our customers, but presently enables designing of total solutions imbibing digital technologies such as IOT, Cloud, AI & ML which cater to high value niche market segments, not addressed by competitors.

Investments in R&D has led to consistent innovation in designing, patenting, developing and manufacturing a wide range of high technology instruments in the field of Electrochemistry, Spectroscopy and Chromatography, which are used for

chemical & biological analysis, that find applications in the sectors of Agriculture, Water, Research/Academia, Healthcare, Pharmaceuticals/Life Sciences, Chemical/Petro-Chemical, Food/Beverage, Defence/Homeland Security & many others.

The past six decades has seen the company achieve market leadership in developing & manufacturing Analytical Instruments, which play a major role in improving the quality of life & the well-being of people as well as the quality of the environment. Apart from instrument development and manufacturing with its strong base of systems certified for ISO 9001, ISO 14001 & ISO 27001 standards, ELICO provides R&D and Manufacturing Services to Global Analytical Instrument Companies.

OVERVIEW

A strong commitment towards research and development is at the heart of every Elico Employee and is the potent ingredient behind every successful Elico Product. Our State-of-the-art R&D department has been recognized by the Department of Scientific and Industrial Research (DSIR), Govt. of India since 1973 and has elicited numerous National and International awards. Our dedication and commitment towards research has not only yielded tremendous success for our organization, but enabled our customers to address their analytical needs in an innovative way.

Our multi disciplinary competencies in different engineering domains coupled with cross functional skills and expertise have enabled our customers from diverse industry sectors address their challenges pertaining to their product quality and consistency. Our instrument and service offerings have been customized to cater to unique opportunities which help in creating a sustainable environment for all.

The company's R&D Team prides itself in being the backbone of the organization and consists of Senior Scientists, Scientists and Subject Experts who together spearhead the innovation culture at Elico.

QUALITY & CERTIFICATION:

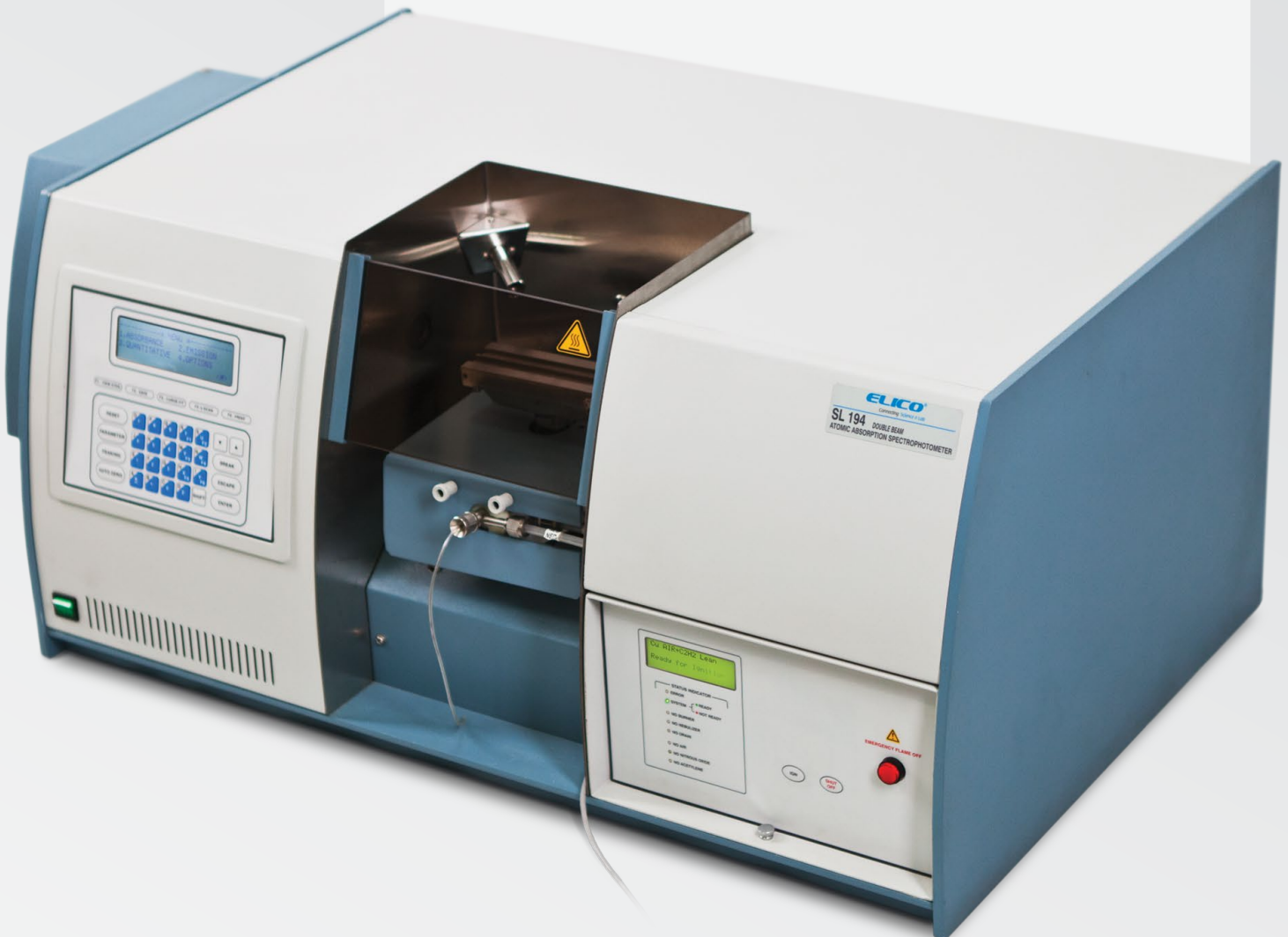
We adapt to the worldwide best practices. All our processes are conducted as per the guidelines provided in ISO 9001:2015 (QMS), ISO 14001 (EMS), ISO 27001 (ISMS). EN 61010-1:2010, EMC/EMI as per EN 61326-1:2013, Instrument also tested at NABL approved Lab and EQDC approved Lab for its Performance and quality.



ABOUT INSTRUMENT

The instrument is compatible with High Resolution of 1.5 nm/mm.

Our Atomic Absorption Spectrophotometer is highly temperature durable it can be operated at lower temperature of 8° C to 15° C and in Higher side Up to 45° C temperature , along with Relative Humidity % (RH) of 80 to 85 (at 40° C temperature)



True Double Beam
Atomic Absorption
Spectrophotometer

SL194



Burner
Alignment



Double
Beam



LCD
Display



Auto
Ignition



PC

SALIENT FEATURES

- Standalone Operation in case of PC failure.
- Microcontroller based user friendly, Menu driven with printer interface and optional PC attachment through USB interface.
- Modes of operation include Absorbance, Emission and Concentration.
- Background correction with D2 lamp source.
- Auto Saving of all parameters & Auto-Bandwidth Selection.
- Self Diagnosis, Automatic Wavelength Selection and Auto scan for Peak Searching.
- Burner Movement through Computer and Manual in all three directions - height, rotation and lateral.
- The Software has facilities to repeat the result of the sample and data treatment.
- Automatic calculation of percentage and ppm in base material.
- Optimization of flame conditions for each element with detachable burner.
- Automatic Setting of Parameters by selecting the Element (including Hollow Cathode Lamp).
- Absorbance Mode has the facility to measure sample absorbance for selected number of points and to calculate Mean, SD and RSD.
- Microsoft Windows® based software for Instrument Operation for Data Control, Data Processing, Storage, Repeat Result, Retrieval, Interpretation, etc.
- **OPTIONAL :**
Autosampler Attachment, Hydride Generator.

Fully Computer Controlled.

High Energy True Double Beam Optics with Narrow Beam, fully sealed and Quartz over coated mirrors.

Automated Six/Eight lamp turret compatible to coded & non- coded Hollow Cathode Lamps with independent Power Supply and Alignment for each Lamp.

Integral Micro Controller based Auto Flame control with all safety features.

SOFTWARE FEATURES

- Microsoft Windows® based PC operating Software.
- Easy User Interface.
- Linear / Quadratic curve equation to predict the sample concentrations.
- Modes of operation include Absorbance, Emission, Concentration and Standard Addition.
- Saving facility for the scanned Data. Print facility for all the scanned Data in Graph and Tabular formats.
- Automatic burner optimization through PC. Flame Control through Software.
- Energy Profile Mode to scan the energy of HC Lamp, D2 Lamp and Flame.
- We provide Open Source Software complying International Quality norms, compatible to run on MS- Windows® Platform.
- Software is 21 CFR Part 11 compliant with password method protection, Instrument logbook etc.

Specifications

SPECTRAL

Range	185 to 900 nm
Bandwidth	Automatic variable slit from 0 to 2.5 nm continuously variable with increment of 0.1 nm
Readability	0.1 nm
Accuracy	± 0.5 nm
Repeatability	± 0.2 nm

DETECTOR

Wide Range Photo Multiplier Tube (PMT)

POWER SUPPLY

HC Lamp	0 to 30 mA modulated
D₂ Lamp	15 to 300 mA modulated
PMT	-200 to -1000 Volts

DATA PRESENTATION

Display	240 X 64 dots Graphic LCD Module
Hard Copy	On printer (Centronics)

BACK GROUND CORRECTION

Integral Auto Gas Control System with LCD Display, Keyboard and all Fault Indicators with all safety features

Automatic Flame Changeover, Auto Ignition and Shut Off

Optimization of Flame Conditions for each Element with programmable Flame Control

SAFETY FEATURES

Full Safety Interlocks including Pressure Sensors on both lines, Flame failure Detection, Burner Presence and Recognition, Nebulizer Presence and Drain Sensor, Power Failure Protection and Emergency Flame Shut Off Switch and Flash Back Arrester on the Cylinder

PHOTOMETRIC

Range	0 to 2 Abs
Accuracy	± 0.010 Abs at 1.0 Abs
Integration Time	0.04 to 99 sec

LIGHT SOURCE

6/8 Lamps Automatic Turret with Independent Power Supply compatible to coded and non coded HC Lamps.

BACK GROUND CORRECTION

Deuterium Lamp (D₂)

MONOCHROMATOR

Czerney Turner 1/3 m with 1800 lines/mm Holographic Grating and Hard Coded Optics.

DATA PROCESSING

Microprocessor Mode 1. Absorbance 2. Emission 3. Quantitative Curve fit (Linear and Quadratic).

PC Mode Microsoft Windows® based PC Operating Software with following Operations.

1. Absorbance 2. Concentration (Standard Calibration and Addition), Curve fit Options - Linear and Quadratic 3. Emission

BACK GROUND CORRECTION

Titanium construction, Premix Laminar Flow

100mm burner for Air - Acetylene (C₂H₂)

Optional - 50 mm burner for Nitrous Oxide (N₂O) - Acetylene (C₂H₂)

The Spray Chamber is made of Inert Material .i.e., PTFE (Teflon) fitted with adjustable impact bead Aerosol

FUEL

Acetylene (C₂H₂)

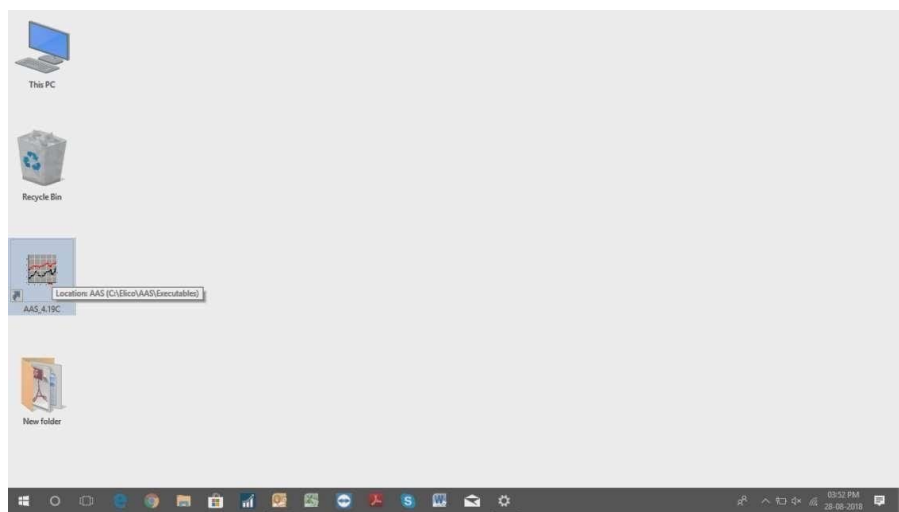
OXIDANT

Air / Nitrous Oxide (N₂O)

Software

Communicating to the instrument:

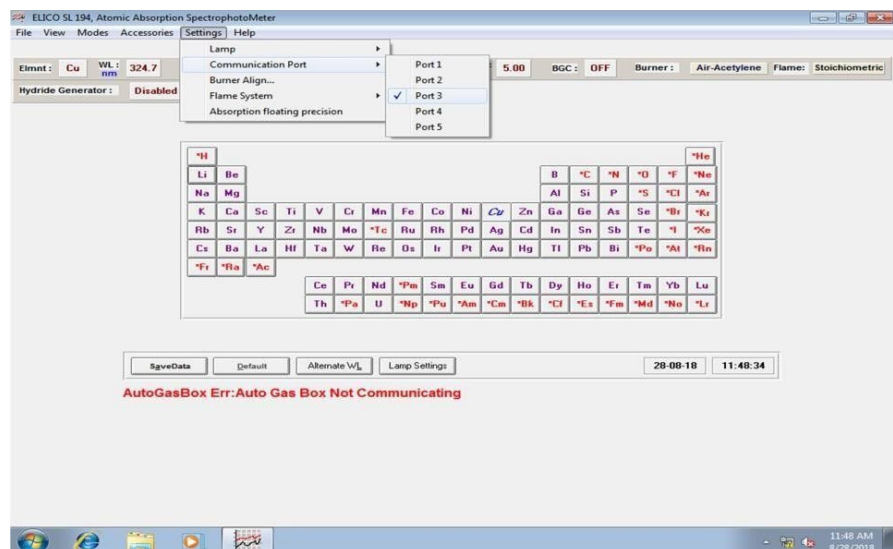
Open the AAS software
(Double click on the AAS
icon on the Desktop)



Note

1. Make sure the instrument is switch ON and appearing MENU modes in the Display.
2. USB cable is connected from Instrument to PC

Select the Communication
Port option from the Settings
menu and choose the port to
which the instrument is
connected to the PC.

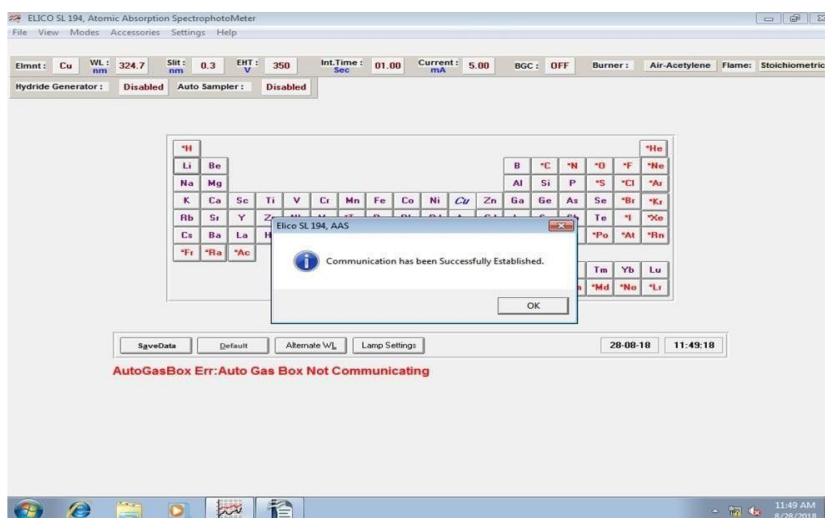


A message is displayed to show whether the communication with the instrument has been established or not.

Communication is successful, the below message will be displayed.

If not, verify the instrument and USB cable connection.

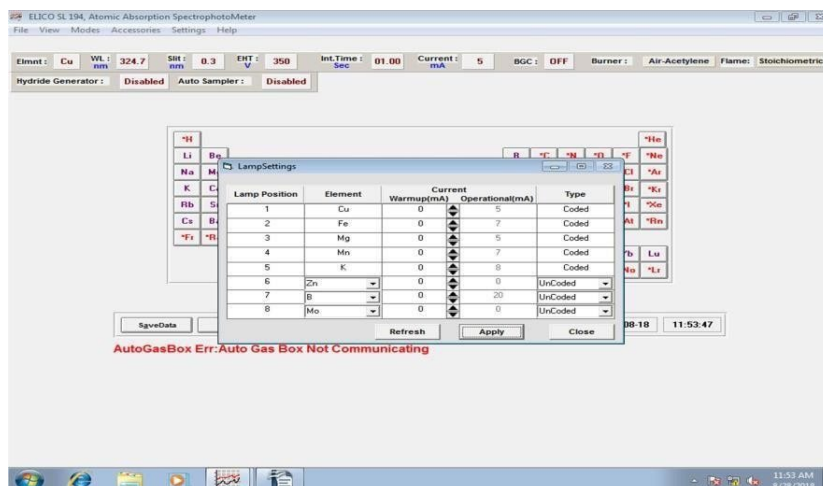
Click on OK, the Lamp setting will be appear



Lamps settings:

If the coded Lamps are used, automatically the Elements are updated in the lamp position.

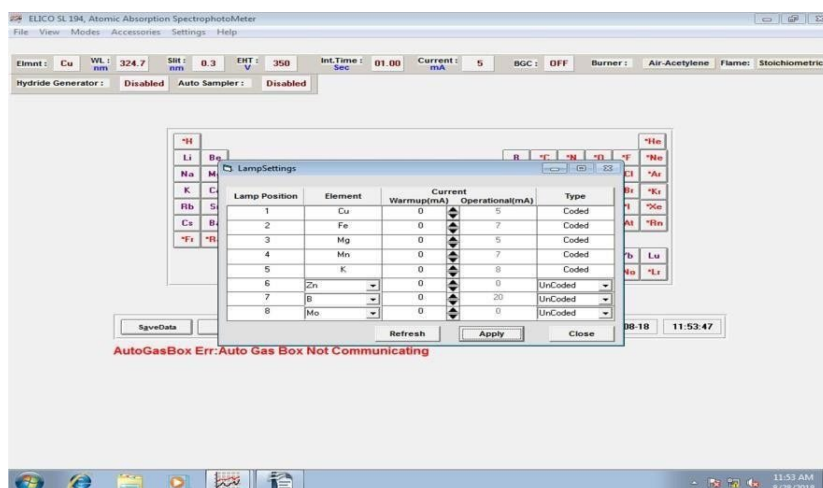
If un-coded/non coded Lamps are used, then select un coded lamp (click on the right side drop box), and select the required Element from drop down menu for each position and click on apply.



Selecting the element:

Select the element by clicking the element in the periodic table. As soon as the element is selected, the default parameters for the element are displayed on the screen and Element will be set on Flow control panel as shown below.

If need to modify/change the parameters, follow the below procedure.



Wavelength:

If the wavelength of the element has to be changed then click on the wavelength value to obtain a dialog as shown in right.

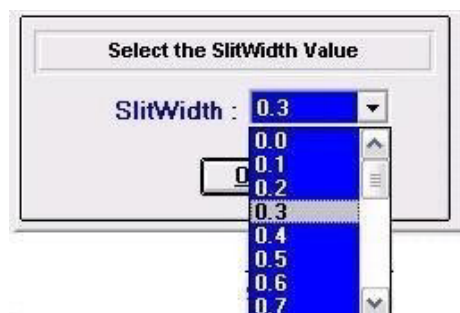
Change the wavelength as required and choose OK.



Slit Width:

Slit width adjustment is automatic from 0.0 to 2.5 nm continuously variable with increment of 0.1 nm and can be changed by clicking on the value of the slit, which shows as dialog a shown in right.

Select the required slit width from the list and choose OK.



EHT:

Value of EHT giving to the detector can be changed by clicking on the value of the EHT, which shows as dialog as shown in right.

The required EHT value can be changed either by entering the required value or by clicking the Spin buttons.

Select the required EHT and choose OK.



Integration Time:

Integration Time can be changed by clicking on the value of the Integration Time, which shows as dialog as shown in right.

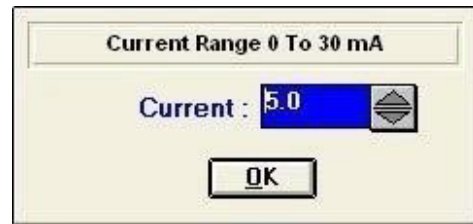
The required Integration time can be changed either by entering the required value or by clicking the Spin buttons.

Select the required Integration Time and choose OK.



Current:

Current supplying to the lamp under operation can be changed from the default value depending on the requirement. Current can be changed using the dialog shown in right.



Note

Refer to the Brochure provided with the lamp. Don't exceed the limit.

BGC:

We can choose whether D2 Lamp background correction has to be done for the application or not using the BGC option. The BG Correction is applicable only if the wavelength of the element is in UV region. This can be set to ON or OFF depending on the application.



Warm up current:

Warm up current can be set to the lamp using the following dialog, which appears when the value of warm up current is clicked.

Select the warm up current value as required and choose OK.



Burner:

Burner Movement lateral, Horizontal and height is Automatic and through Computer and Manual. Once the element is selected the default burner type will be loaded automatically (Air- Acetylene, Nitrous oxide- Acetylene)

Flame:

Default flame type will be loaded once the element is selected. To change the flame type click on Flame type, select appropriate flame.

On using this mode, the Absorbance Values of the Samples can be found by using Standard data, which are correlated in the form of a calibration Curve.

This mode is divided into 2 major subdivisions

Standard Analysis Sample Analysis

On Selection of this mode, the HC Lamp Energy Graph appears on the Screen.

After Scanning the related Element Energy should be 2.5V to 3.5V, if no, adjust/modify the parameters to get above energy.

Sample Analysis:

In the Menu View, When Standard Calibration is Selected following parameters need to be specified, in the dialogue box that appears on the screen:

No. of Standards – This is used to enter the Number of Standards, which can be used for calculation of the absorbance.

The Minimum No of Standards that can be entered is 2 by which we can perform the least Square Fit; whereas the Maximum no of Standards that can be entered are 10.

No. of Points – Specifies the No of Points, the data is been read from the instrument for the calculation of the Absorbance Value.

Aspiration Std No: – Specifies the List of Standards, On Selecting the particular Value and if Start is clicked the absorbance for the particular Standard is calculated.

Up – This is used to increment the value of the Aspiration STD No.

Down – This is used to decrement the value of the Aspiration STD No.

Start – On pressing Start the Absorbance values for the Standard, which is selected in the Aspiration STD No, is calculated.

Stop – This is used to stop the Operation.

Auto Zero – This is used to perform the Blank Aspiration by using blank or distilled water, the absorbance thus obtained is subtracted from the Absorbance value of Standard or Sample data

Click on the Enter the No. of Standards box and enter the value (Ex: 3,4..) and click OK.

Now check the required flame conditions requirements presence like AIR, Acetylene and Nitrous oxide. If any error, check the related conditions.

If all the Flame related conditions are ok, click on Ignition. After establishing the Flame Feed Distilled water and click on Auto zero. Observe the values are appearing around ± 0.003 below. If not click again on Autozero.

Then feed the Standard 1 (Make sure the Aspiration std. No 1) and wait until the no. of point complete and display the Mean, SD, RSD.

Now feed the Standard 2 and so on..., after completing all the standards, below screen will appear, based on your no. of standards.

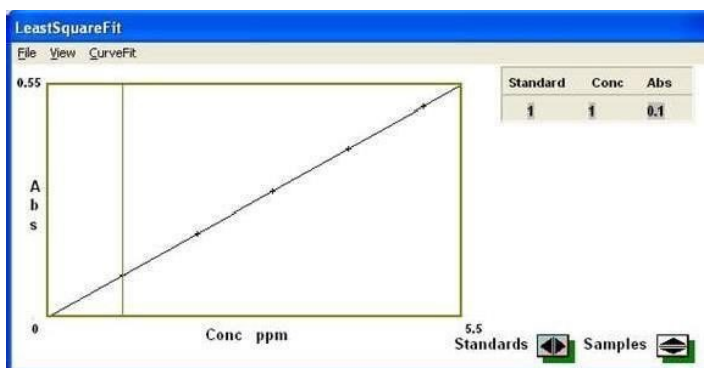
No	Conc	Abs
1	1	0.1
2	2	0.2
3	3	0.3
4	4	0.4
5	5	0.5

Note: Here the Conc. Values are Manually Entered Depending upon the standard.

Now click on view and select the Graph, then select the CurveFit After Selecting Graph the following dialogue Appears,

From the Above dialogue, you may select the Curve Fit as either Least Square or Quadratic depending on the number of Standards.

After Analysis of Standards, Sample Analysis can be performed by selecting Samples option from the View Menu in the Graph, which is displayed above.



Sample Analysis:

Upon Selection of the Samples the following dialogue box appears, with the following parameters to be mentioned. The sample volume will be consumed 3-8 ml/min

Time for sample analysis by instrument within 8 -10 second

No. of Samples – This is used to enter the Number of Samples, which can be used for calculation of the absorbance.

No. of Points – Specifies the No of Points, the data is been read from the instrument for the calculation of the Absorbance Value.

Aspiration Std No: – Specifies the List of Samples, On Selecting the particular value and if Start is clicked the

absorbance for the Selected Sample is calculated. Up – This is used to increment the value of the Aspiration STD No.

Down – This is used to decrement the value of the Aspiration STD No.

Start – On pressing Start the Absorbance, Concentration values for the Samples, which is selected in the Aspiration STD No, is calculated.

Stop – This is used to stop the Operation.

Auto Zero – This is used to perform the Blank Aspiration by using blank or distilled water, the absorbance thus obtained is made Zero.

In the table on right, the Name of the Sample can be given by clicking Sample Cell

Here by Default D.Fact (Dilution Factor) is 1 this can be changed manually by clicking the D.Fact cell. When the Dilution Factor is changed the Conc, %Wt, % Conc of the Sample also changes with respect to the Dilution Factor.


Upon Calculation of the absorbance of the Samples, which were entered. We can view the data in the form of calibration curve, which can be seen by using the Graph that is present in Menu item View.

After Selecting Graph the following dialogue Appears, by selecting Least Square Fit or Quadratic fit the Calibration Curve of the Standards and Samples can be displayed.

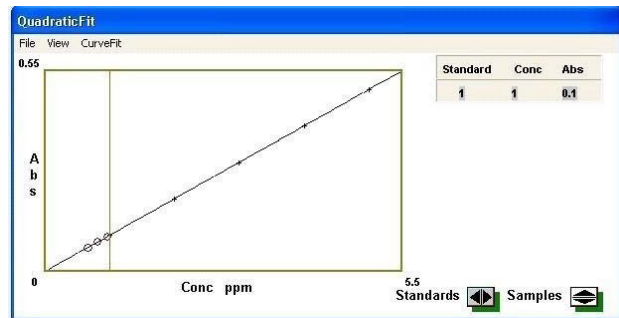
No	Sample	Abs	Conc	%Wt	%Conc	D.Fact
1		0.0946	1.48	0.00015	0.0002	1
2		0.0646	0.92	0.00009	0.0001	1
3		0.0795	1.19	0.00012	0.0001	1

In the Above graph

1. Standards Values are shown by using ' + ' Symbol
2. Sample Values are shown by using ' O ' Symbol

By clicking the Standards  button the Crosswire can be moved across the Standard values, this is shown in the Table above.

By clicking the Samples  button the Crosswire can be moved across the Sample Values.



Save:

To save the data, go to File and click on Save, and give appropriated name and location for saving.

Print:

To Print the data, go to File and click on Print and give appropriated name and remarks for printing. To print data table, give print when table data screen and to print Graph give print in the Graph screen.

Accessories

ELICO Hollow Cathode Lamp:

Each Hollow cathode Lamp with both single or multiple Element Type is to ensure that it will perform to Specification according to instrument Please be sure to start your lamp on the Lower run current and Increase the current One mA at a time until the peak energy of your Lamp is found.

Running your lamp ON Lower current will prolong the life of your Lamp up to 5000 mA-hr



Nebulizer:

Made of fully Inert Material with 90% Platinum and 10% Iridium Alloy Capillary and adjustable aerosol based flow, A highly Corrosion Resistance and Pneumatic Nebulizer.

Coolant in instrument is operated as AIR Type Technique.



Monochromator

Czerney Turner 1/3 m with 1800 lines/mm Holographic Grating and Hard Coded Optics. With High Focal Length of 330 nm

Air Compressor

OIL Free Air Compressor HS-WP 1T, $\frac{3}{4}$ HP with Tank Capacity Of 20 Ltr. with high grade Air Purifier filter with necessary Pipes and fittings



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