ICP-6810-A2 Inductively Coupled Plasma Emission Spectrometer

sisco

DOCUMENT NUMBER

SMS-MACY6810A2-2024

Menu

1. Product Overview

ICP6810 is a high-tech product developed and designed by SISCO. Its full name is the full spectrum direct read inductive coupled plasma emission spectrometer (Inductively Coupled Plasma), which is mainly used in rare earth industry, silicon industry, petrochemical industry, ore analysis, metal smelting, geological research, drug safety, experimental research, environmental testing and other fields.

1. Instrument composition and working principle

1.1. Basic composition of instruments

ICP-6810-A2 instrument mainly consists of the following main parts: host control system, power matching system, injection system, etc. The details are as follows:

1.1.1. Instrument appearance

The appearance of this instrument is shown in the following figure:

Figure 1. Instrument appearance diagram

1.1.2. Internal structure diagram of the instrument

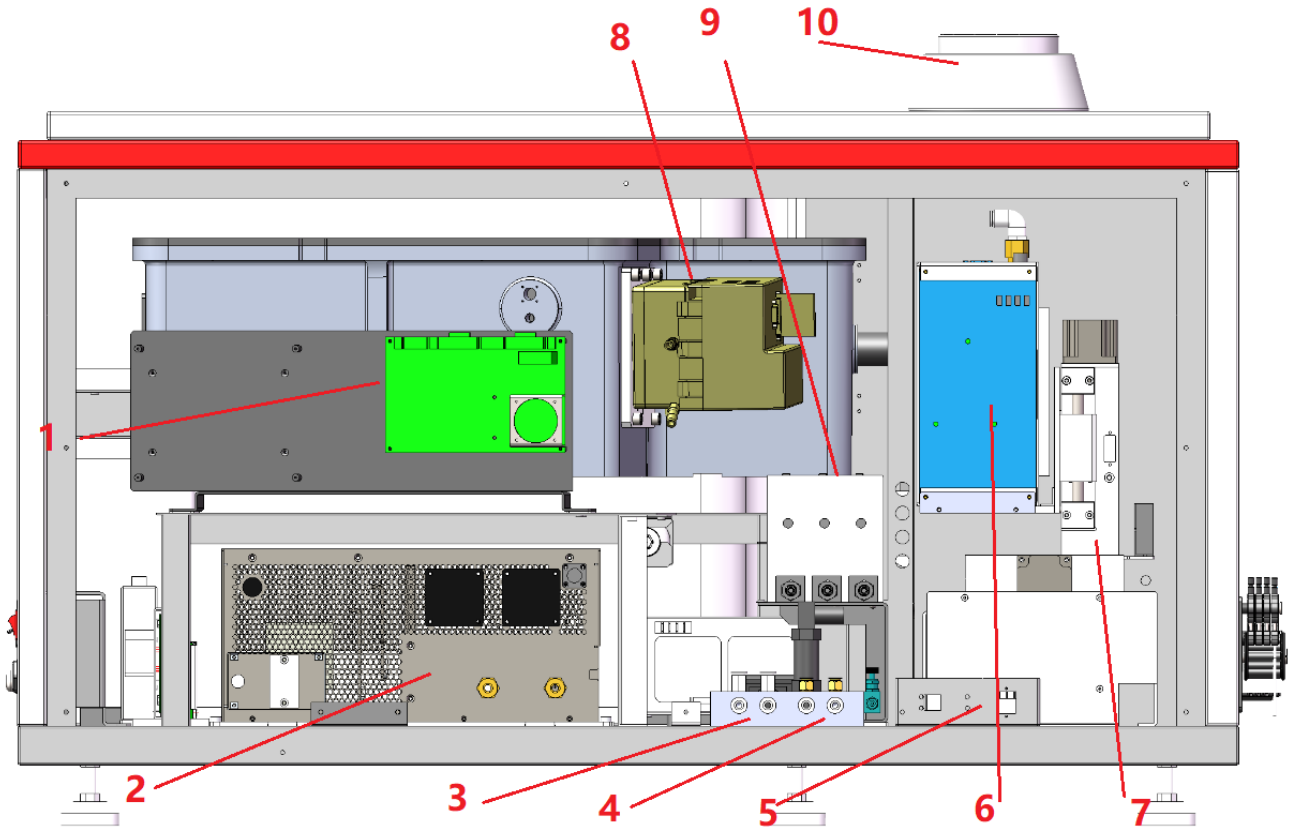


Figure 2. Internal structure diagram of the instrument

1. Light path system
2. RF power supply
3. Waterway import and export
4. Airflow interface
5. Net mouth
6. Matching system
7. Collimation system
8. The detector
9. The MFC control system
10. Chimney

1.1.3. Automatic observation and regulation system

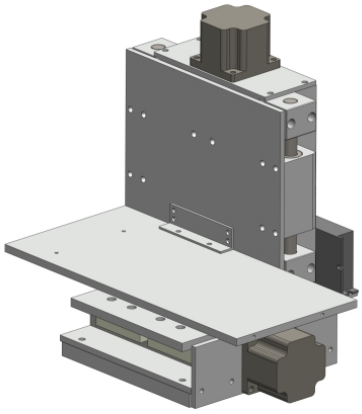


Figure 3. Automatic adjustment platform

Automatic adjustment platform: automatically controlled by the computer, used to adjust the size of the flame center position, to achieve the best observation position.

1.1.4. sampling system

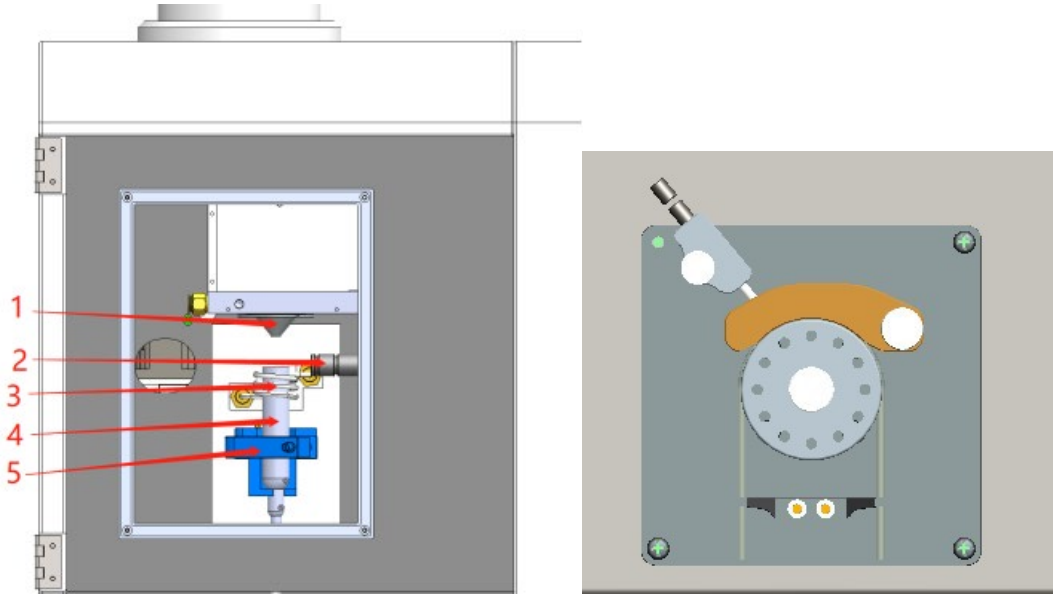
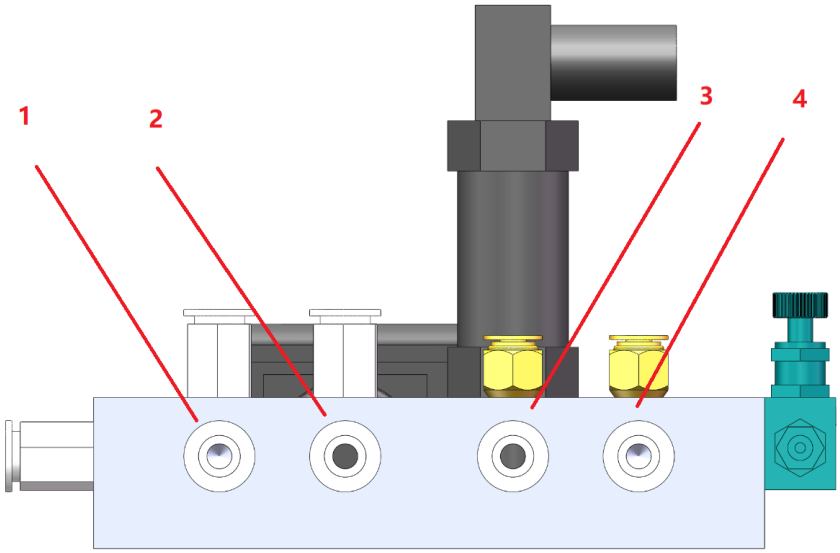


Figure 5. Peristant pump system

1. Cold cone
2. Mirror tube
3. High frequency coil
4. Torch tube
5. Torch tube fixture

The injection system mainly includes: atomizer, atomization chamber, plasma gas, carrier gas, auxiliary gas, moment tube, peristaltic pump, as shown in the figure above.

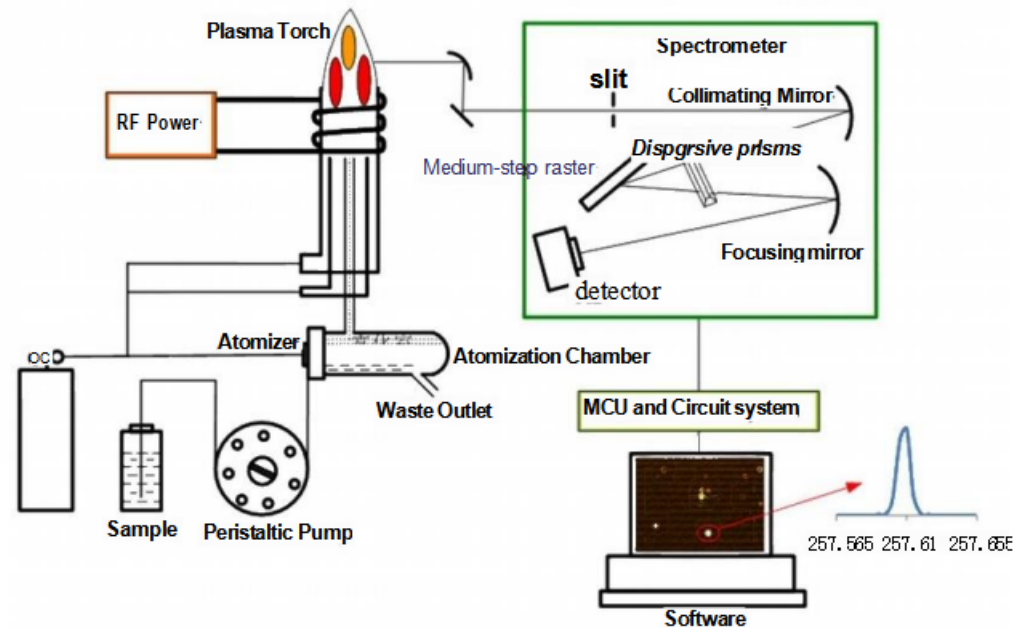
1.1.5. Water-cooling and gas interface



1. Cooling the circulating water inlet water
2. Cooling the circulating water effluent
3. Argon gas plasma gas interface
4. Nitrogen / argon purge air circuit interface

1.2. Basic working principle of the instrument

The basic working principle of this instrument is as follows:

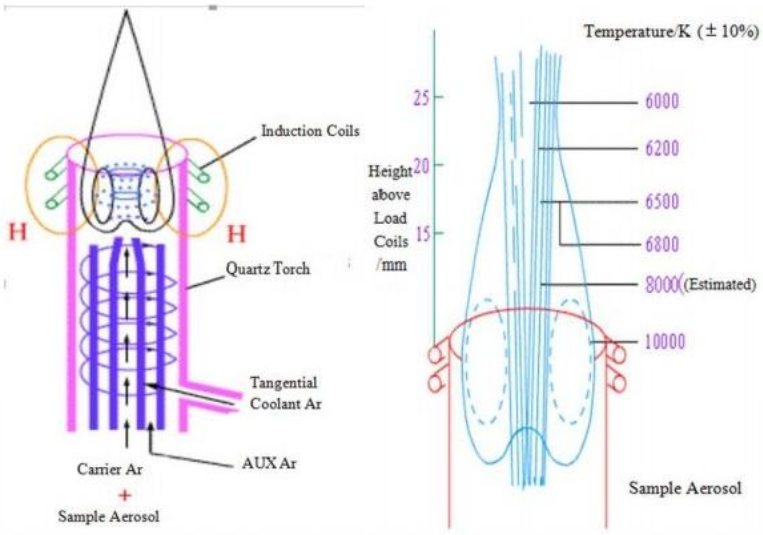


Working principle: the high frequency power generated by the RF generator is added to three layers of

concentric quartz torch tube through the induction working coil to form the high frequency oscillation electromagnetic field; the outer layer of the quartz torch tube, and the high voltage discharge to generate charged particles in the high frequency electromagnetic field, produce more charged particles, and the temperature increases, finally forming the argon plasma, the temperature of the plasma can reach 6000K~8000K. The sample of the aqueous solution enters the central channel through the aerosols formed by the quartz torch tube, and is excited in the high temperature environment to emit the characteristic line of the element contained in the solution; by lighting the plasma light source and imaging the polychrome, the characteristic line of the element to be measured is located at the corresponding pixel position of the detector, the line is converted into an electrical signal and transmitted to the computer for data processing, and the analysis result is printed by the printer.

1.3. Operating principle of the key components of the instrument

1.3.1. Formation principle of an inductively-coupled plasma ICP



The operating frequency of the high frequency generator is 27.12MHz, and its main function is to produce a high frequency electromagnetic field to supply the plasma energy. The torch tube is a three-layer concentric quartz glass tube with cooling argon flowing into the outer tube to avoid the plasma torch burning the quartz tube. The middle quartz tube exits in a trumpet shape, with argon gas flowing in to maintain the plasma. The inner diameter of the inner quartz tube is 1mm-2mm, and the sample aerosol is introduced into the plasma by the carrier gas.

When the high-frequency power supply is connected to the load induction coil around the plasma torch

tube, the high-frequency induced current flows through the coil, generating an axial high-frequency magnetic field. At this time, the cooling argon is injected to the tangent direction of the outer tube of the torch tube, and the auxiliary gas argon is axial (or tangential) into the middle tube, and the charged particles are excited with the high frequency ignition device. When the charged particles are large enough to cause the gas to have enough conductivity, an annular vortex current is generated in the section perpendicular to the direction of the magnetic field. A powerful induced current of a few hundred amps instantly heated the gas to 6000K-8000K, forming a torch-like stable plasma torch above the rectangular tube mouth.

1.3.2. Solid-state generator and automatic matching box

Solid state generator

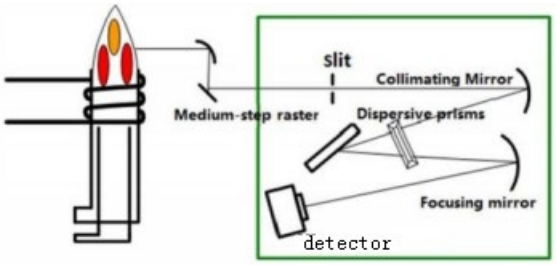
ICP-6810-A2 high frequency generator is an all-solid state RF generator independently developed by SISCO. It adopts its exciting oscillation circuit and the working frequency is 27.12MHz. Compared with the self-excited shock tube RF generator, the all-solid state RF generator has many advantages of smaller volume, higher output power, more stable frequency power and higher power efficiency.

Automatic matching box

ICP-6810-A2 automatic matching box has the advantages of fast matching speed and high accuracy, which eliminates many troublesome operations of manual matching.

1.3.3. polychromator

The polychromatic device consists of light chamber, illumination light path, slit, collimator mirror, middle step grating, prism, focus mirror and detector. The light compartment focal length is 440mm. The composite light emitted by the ICP light source is focused through the illumination light path through the slit and incident on the collimated mirror. After being reflected by the collimated mirror through the prism to the middle step grating, diffraction, then passes through the prism again and measures the spectral signal on the detection surface of the detector through the focusing mirror imaging.



1.3.4. Electronic measurement and control circuit

The circuit system has four functions: communication, gas circuit control, step motor control and signal acquisition.

1. Communication

The RJ 45 network port is used as the communication interface between the instrument and the computer. Network port communication has many advantages, such as stable interface, fast communication speed and strong anti-interference ability.

2. Gas control

ICP-6810-A2, the gas path using advanced MFC (mass flow controller) as a control parts, respectively control plasma gas, carrying gas, auxiliary gas, high control accuracy, fast response speed, stable flow, with flow feedback function at the same time, can monitor the actual flow of each gas, ensure the sample system work stability, improve the repeatability and stability of the instrument.

2. Product specifications and technical indicators

2.1. high frequency ionizer

1. Circuit type: all solid state RF power input power supply: 220V, 30A

2. Working frequency: 27.12MHz Frequency stability: <0.1%

3. Electromagnetic field leakage radiation intensity: 30cm away from the chassis, electric field: E 10V / m; magnetic field: H < 0.2A/m

4. Three-way gas control flow size

Plasma gas flowmeter: (1~20) L / min

Auxiliary air flow meter: (0.05~1.0) L / min

Load gas flowmeter: (0.05~1.0) L / min

5. Cooling water: the water temperature range is 20℃ ~25℃, the flow rate is greater than 7 L / min, the water pressure is greater than 0.1MPa, and the resistivity of the cooling water is greater than 1M Ω.

2.2. polychromator

1) Light path: middle step grating + prism cross dispersion focal distance: 440mm

2) Grating specification:, middle step grating Length range: 175 nm to 900 nm

2.3. prober

1) Detection wavelength range: 165nm~900nm

2) Quantum efficiency:> 30%@200nm

3) Refrigerating temperature: -40℃ ~ -45℃

4) Burge flow rate of the detector: 0.3L / min

2.4. Complete machine technical indicators

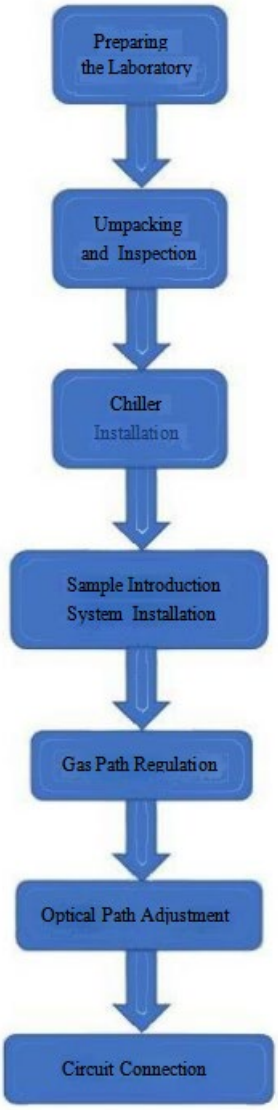
Length range: 175 nm to 900 nm

3. Install and connect

3.1. Preparation before installation

Please read the Installation Notice carefully, and make corresponding preparations before the arrival of our technical personnel as required.

3.2. Flow chart of the instrument installation



Flow chart of the instrument installation

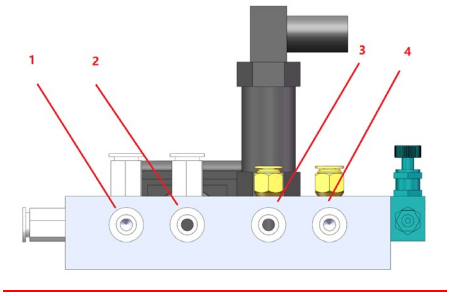
1. Choose the venue

The ICP-6810-A2 spectrometer is 1250m m (long) 693m m (width) 645m m (height) with a weight of 205k g.

2.For instrument installation, see the requirements of instrument installation environment conditions.

3. Installation of cooling water

Remove the cooling water pipes and air pipes from the accessory box. The cooling water pipe is connected to the inlet and outlet of the cooling water below the instrument. [Note: the outlet pipe of the cooling tank should be connected with the inlet of the instrument, and the return pipe of the cooling tank should be connected with the outlet of the instrument. Then, turn on the power supply of the cooling circulation water tank, observe whether the cooling water joints (including the solid power cooling water connection, the detector cooling water joint) have water leakage, and observe whether the water pressure switch is engaged. The sound of suction can be heard during suction.1 is the cooling circulating water inlet, 2 is the cooling circulating water outlet, 3 is the argon gas interface, and 4 is the purge gas interface.



Note: 3 argon gas and 4 purge gas cannot be reversed, otherwise the ignition will fail, and frequent ignition attempts may damage the solid-state power supply.

4. Installation of the sample injection system

Remove the quartz torch tube, fog chamber, atomizer, etc. from the accessory box. The quartz torch tube is installed in the center of the high-frequency induction working coil. They are required to be concentric with the working coil. One turn of the bottom end of the three-turn working coil should be 3-5mm higher than the central pipe port of the quartz torch tube. Plasma gas plastic tube is connected with the air inlet at the upper end of the quartz torch tube. The auxiliary air plastic pipe is connected with the secondary air inlet of the quartz torch tube. The upper mouth of the fog room is connected to the quartz torch pipe and clamped with a clip. The air inlet of the atomizer is connected with the gas-carrying plastic pipe, and the air spray nozzle is inserted into the front hole of the fog chamber. The connection between the capillary and the atomizer does not leak air. The tail of the fog chamber was connected with a Φ 8mm plastic hose to a peristaltic pump injection latex tube through a transfer joint. During ignition and testing, ensure that the peristaltic pump latex tube and the peristaltic pump latex tube are packed. After the installation of the injection system, put the lighter output wire (red high-voltage line) in the plasma gas inlet of the quartz torch pipe.

5. Air route regulation

Open the purge gas cylinder and adjust the outlet pressure to 0.2MPa; open the argon bottle and adjust the plasma gas outlet pressure to 0.3MPa. Turn on the gas through the software on the computer, and observe whether there is any air leakage.

6. Circuit connection

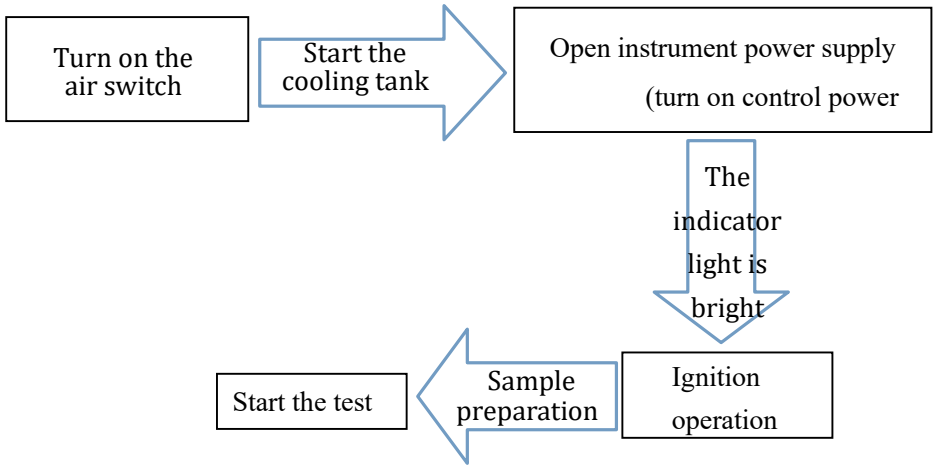
Open the accessory box. Remove the black power cord and connect one end to the power supply air switch (greater than 32A air switch). The network port of the computer is connected to the rear communication output port of the instrument. The high-frequency ground wire is connected with the ground terminal behind the instrument. The computer ground wire is connected with the instrument ground wire.

Note: Please complete the above steps under the guidance of our technical personnel.

4. instrumentation

4.1. Instrument operation process

Note: The detector has been purging for more than one hour before the instrument is turned on. The full spectrum detector is an expensive device, without sufficient purging, that is, refrigeration operation, will damage the detector.



1. Turn on the air switch

Turn on the air switch for the RF power supply, and then open the power supply switch for the regulator.

2. Start the cooling water tank

Turn on the power supply of the cooling water tank and hear the suction sound of the water pressure switch in the instrument. If the cooling tank does not start, the instrument will not be able to fire.

3. Turn on the instrument power supply

Turn on the switch for controlling the power supply on the side of the instrument.

Note: Turn on the control circuit switch (red), and then turn on the air switch (black). When turning off the instrument, break the air switch (black), and then the control circuit switch (red).

4. Ignition

After successful online (including, the detector is successfully connected, and the temperature is normally displayed), you can directly click the ignition button to ignite. Ignition airflow settings recommend using the default settings.

The ignition gas purge time is 30 seconds.

If the ignition fails, extinguish the operation, and then check the air path problem according to the software prompts.

After the ignition, you can click in sample preparation. Note to avoid inhaling air when entering samples to avoid flameout. When not tested, place the injection tube in the irrigation fluid.

5. Start testing

You can start to build methods and prepare for testing.

Note: 1) The normal operating temperature of the detector is-45℃, and the software below-30℃;

2) The premise of the normal operation of the detector refrigeration is that the water tank works normally and the purge gas (nitrogen / argon) has been opened;

3) The instrument heating machine

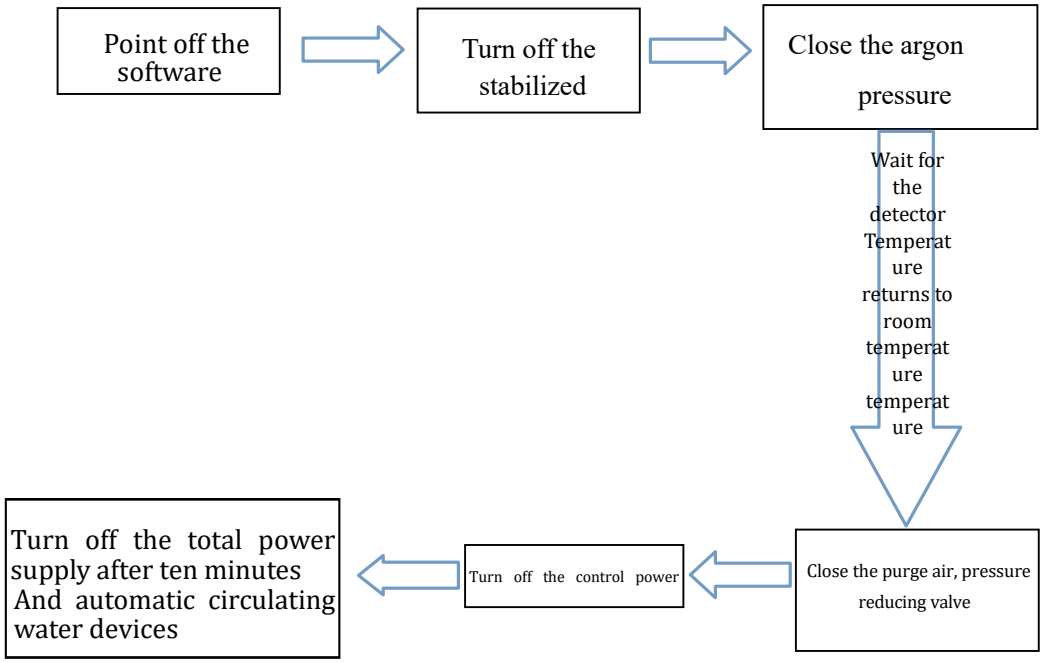
time is 20min.

Other considerations:

1） Before lighting the ICP, first observe the water level of the cooling water tank and whether the refrigeration system is normal.
2） Observe the pressure gauge on the argon bottle whether argon is sufficient for the test time. The consumption of the plasma argon gas bottles is approximately 1.1MPa for 1 hour, and the carrier gas consumption is approximately 0.1MPa per hour.
3） Observe the pressure gauge on the purge gas cylinder, and whether the purge gas allowance is enough for the test time;
4） The cooling gas shall be opened for 10 L/min ~ 12 L/min.
5） The carrying gas pressure should be the best value determined according to the increase amount of the atomizer, which is generally about 0.7L / min.
6） No ignition when indoor humidity is greater than 70% or room temperature is higher than 30℃.

4.2. Instrument shutdown process

The instrument shutdown process must be strictly in accordance with the specifications to avoid the impact of the wrong action on the instrument, which will affect your normal test work. The following is the correct shutdown process. Please read it carefully before operating the instrument.



4.3. Software operation

When the ICP torch is stable and the injection system can be continuously stable, you can use the software tailored for you to test it. Please refer to the Software Specification for detailed steps.

5. Instructions for the use of the software

The ICP analysis software is attached to this instrument.

5.1. Software startup

Double-click the shortcut "" icon of the desktop, and the software displays the welcome interface and then displays the login box as shown in Figure 5.1.

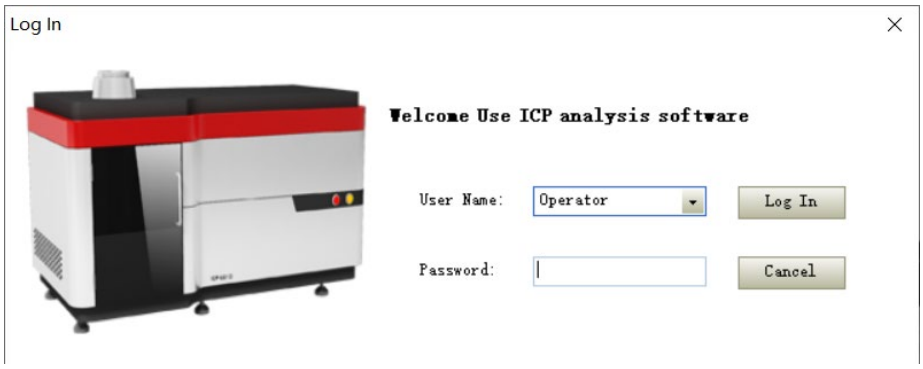


Figure 5.1 Software landing interface

Select the user name to log in and enter the corresponding login password. Click "login" to enter the main interface of the software as shown in Figure 6.2. Click "Cancel" to exit the software login interface.

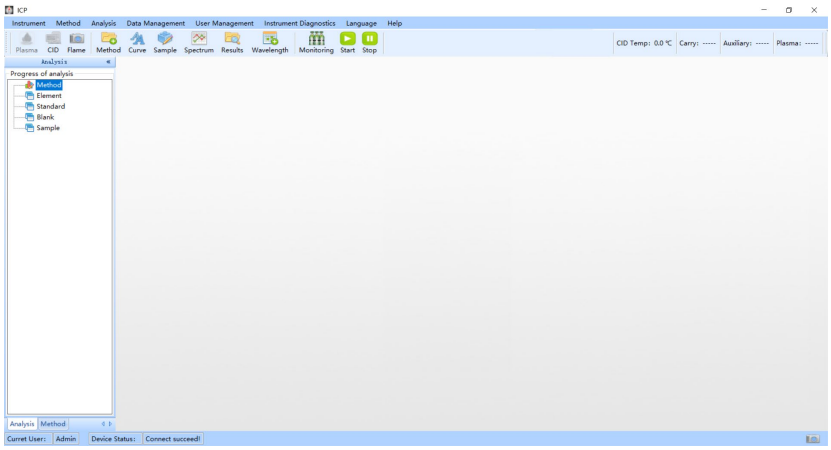


Figure 5.2 Main interface of the software

The main interface of the software is divided into five parts: menu bar, toolbar, status bar, data display area and analysis and measurement control. Analytical measurement control includes three parts: analytical measurement, analytical method and automatic analytical measurement see Figure 5.3.

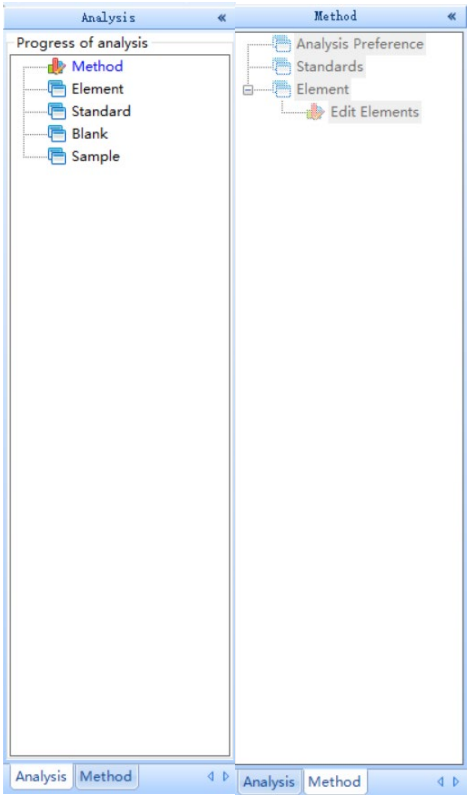


Figure 5.3 Basic Analysis Interface

5.2. analytic procedure

5.2.1. New method

As shown in Figure 5.4, enter the method name to be created and the save result name, and click OK to create a new method.

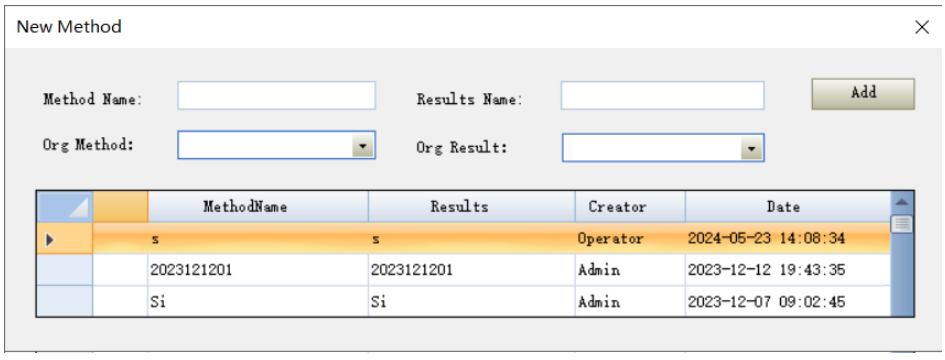


Figure 5.4 Create A New Method Interface

Click "OK" and the "Add" window of the analysis line will pop up, as shown in Figure 5.5.

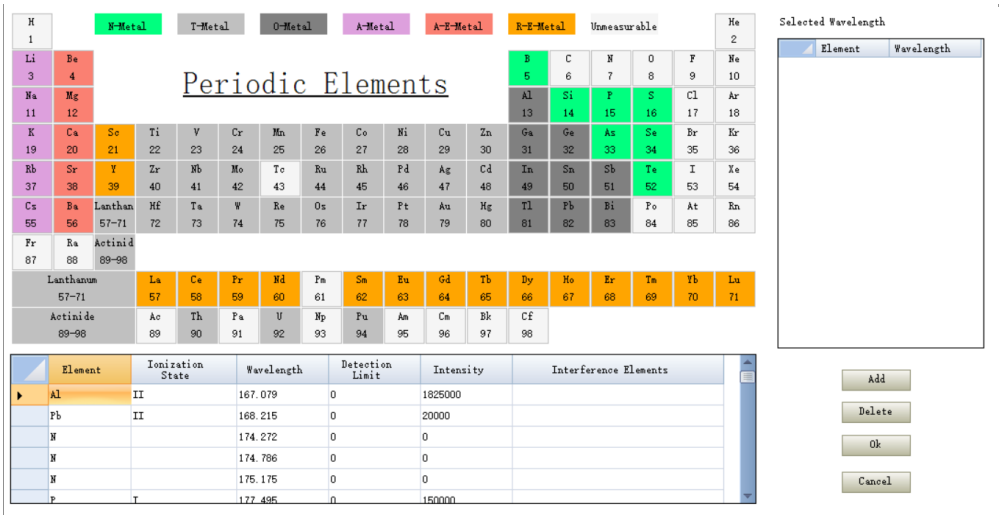


Figure 5.5 Analytical spectral line interface

Click the element name in the periodic table, the corresponding line will be displayed in the list below, select the line to be added, click "Add" to add the line to the "selected wavelength" list, click "OK", the selected line will be added to the current edited method and return to the main interface.

Delete: Remove the currently selected analysis line.

5.2.2. Analyze parameter settings

Click "Analysis Method> Analysis Parameters" in the lower left corner to set the repetition times, sample flushing time, and integration time (see Figure 5.6).

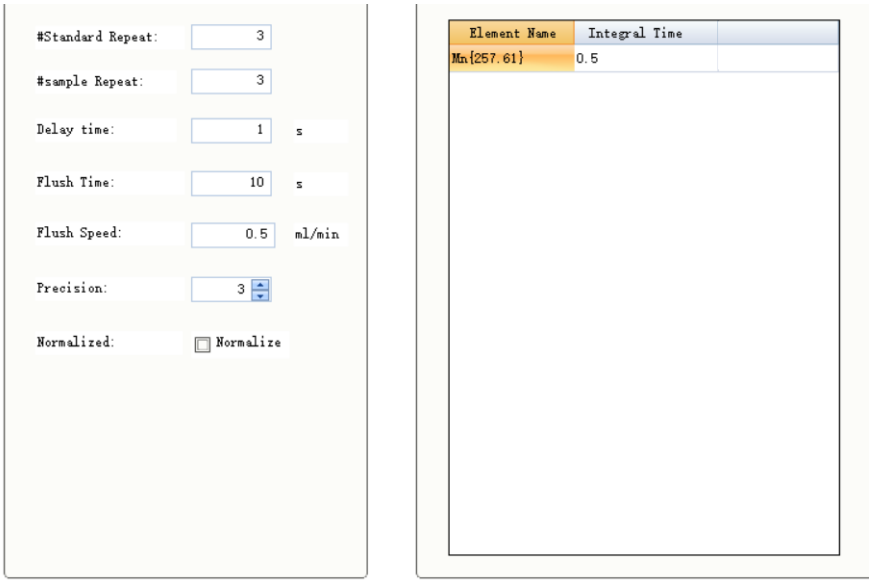


Figure 5.6 Analytical parameter interface

standard

Click "Analysis Methods> Analysis Parameters" in the lower left corner to add and delete the criteria, select the elements contained in the criteria and the required spectral lines, and set and modify the element content (as shown in Figure 5.7)

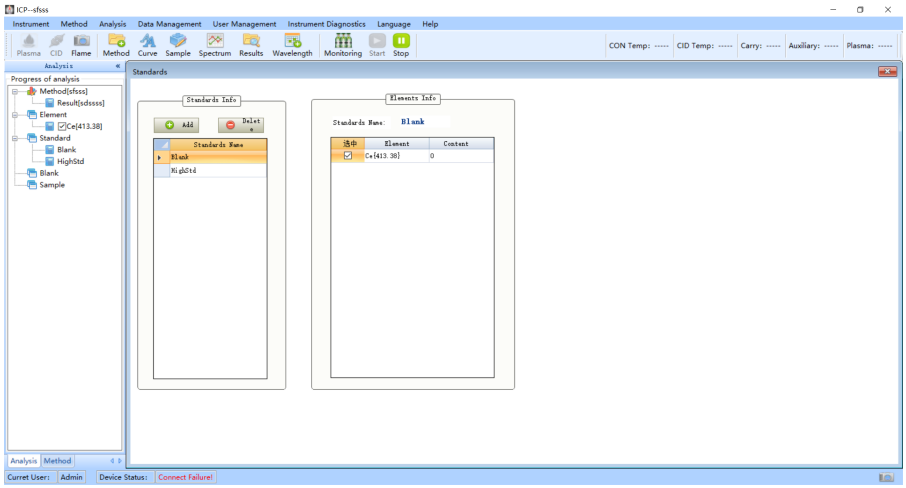


Figure 5.7 Analytical standard interface

Add: Click "Add" pop-up window 5.8 to add the standard sample.

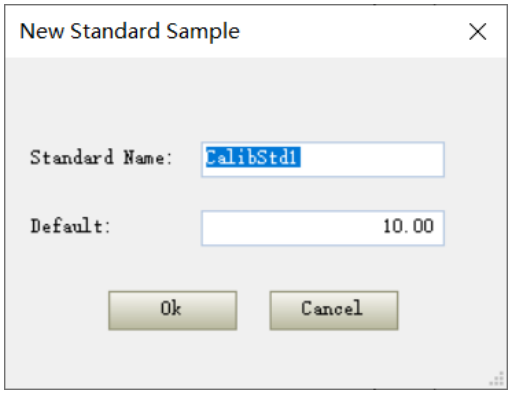


Figure 5.8. Create a New standard interface

Delete: Delete the sample.

Edit: Click the standard name on the left and check the analysis line to be measured by the standard sample on the right.

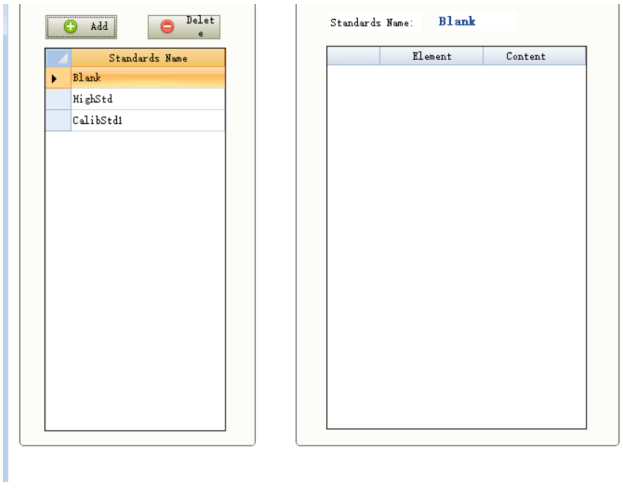


Figure 5.9 Standard editing interface

5.2.3. system of selection

As shown in Figure 5.10, "Analysis Method-> Open method", click "OK" to open the method, and double-click one method can also open the method. You must select a method before analyzing.

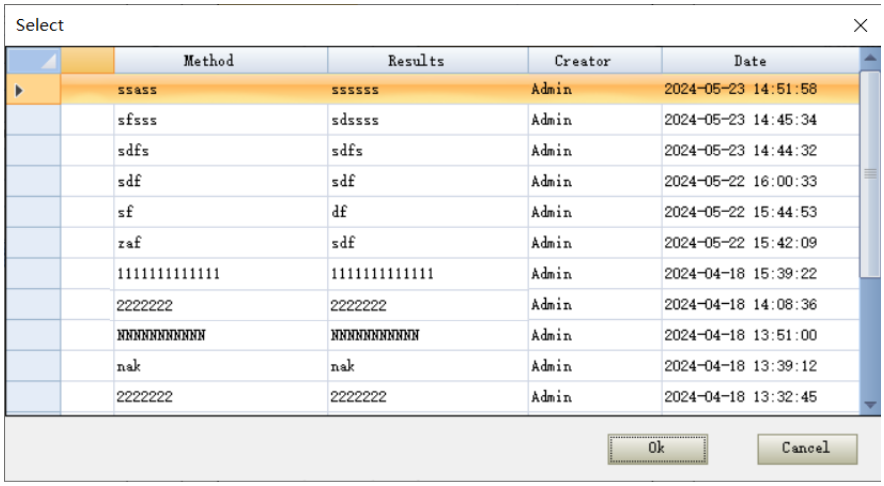


Figure 5.10 Method Selection Interface

5.3. on-line

5.3.1. on-line

Open the power switch of the main control panel and click "Instrument Control-> Online", as shown in Figure 5.11, "Online success" will be displayed in the lower left corner of the software status bar, otherwise "online failure" will appear to check whether the instrument is connected to the computer. After checking, click "Instrument Control-> Online" to get online again.

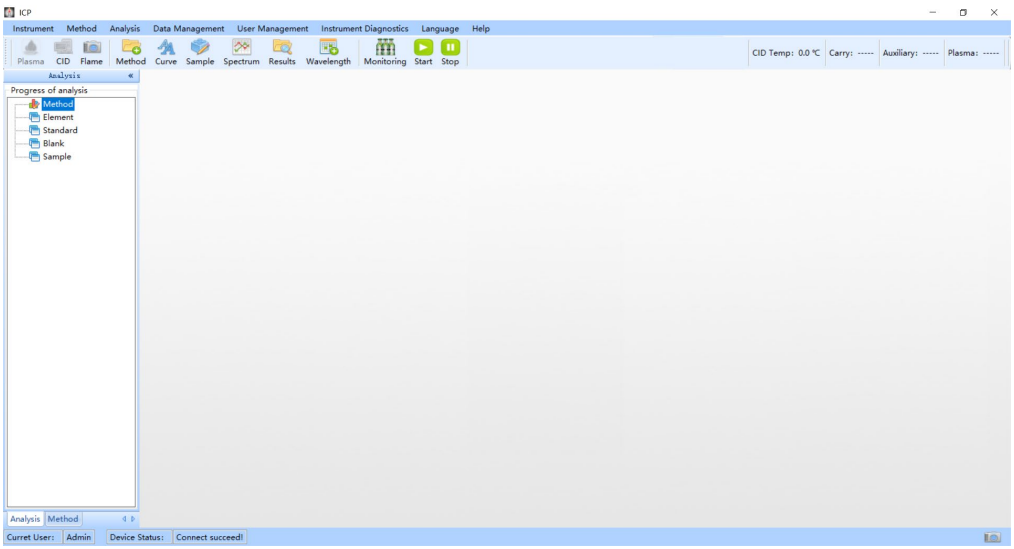


Figure 5.11 Main interface of the software

5.3.2. Connection detector

After successful online operation, the system will automatically connect the detector. After the connection is successful, the detector temperature in the status bar starts to refresh, and can be measured when the temperature is <-30℃. If the connection fails, you can also click "Instrument Control-> Connection detector" to reconnect.

5.3.3. Plasma control

 Click the menu "Instrument Control-> Plasma Control" or the toolbar button "" to pop up as shown in Figure 5.12. Open the valve of each gas (plasma gas, carrying gas, auxiliary gas) and set the gas flow and set the power. You can click "" to refresh in real time to view the actual flow rate of each gas (as shown in Figure 5.13). Before performing ignition, confirm: 

Air purge for more than one hour to prevent the surface coagulation frost of the detector chip from causing damage to the detector;
Check and confirm the correct installation of the sample injection system;
Open the exhaust air;
Apply the peristaltic pump clip and put the sample tube into the rinse fluid.

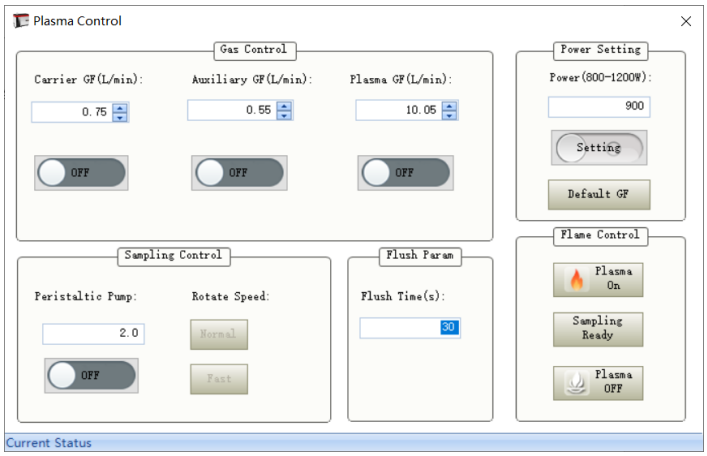


Figure 5.12, Ignition interface

Gas control

The switch of plasma gas and auxiliary gas valve can be controlled respectively, and the flow value of each gas can be set.

Intake control

The switch of the carrier gas and the peristaltic pump can be controlled respectively, and the flow value of the carrier gas and the speed of the peristaltic pump can be set. During the measurement process, the "normal" speed is used, and the "fast" is used when it is necessary to quickly discharge the waste liquid in the fog chamber.

Power setting

Set the operating power of the power supply, can set the range of 800-1200W.

Ignition operation

Ignition: includes the ignition preparation and ignition process, during which Current State is displayed in the status bar.

Injection preparation: set the relevant parameters during the power supply measurement, and restart the load gas

and the peristaltic pump.

Restore the default gas flow rate

Return the flow rate of plasma gas, carrying gas and auxiliary gas to the factory default setting value.

5.4. Analytical measurement

Analytical measurement includes three parts: standard measurement, blank measurement and sample measurement. Set the data storage data set and add selection in the "Select" dialog box (Figure 5.14). The selection of the resulting dataset can facilitate the customers to screen and classify the sample measurement data for the same method.

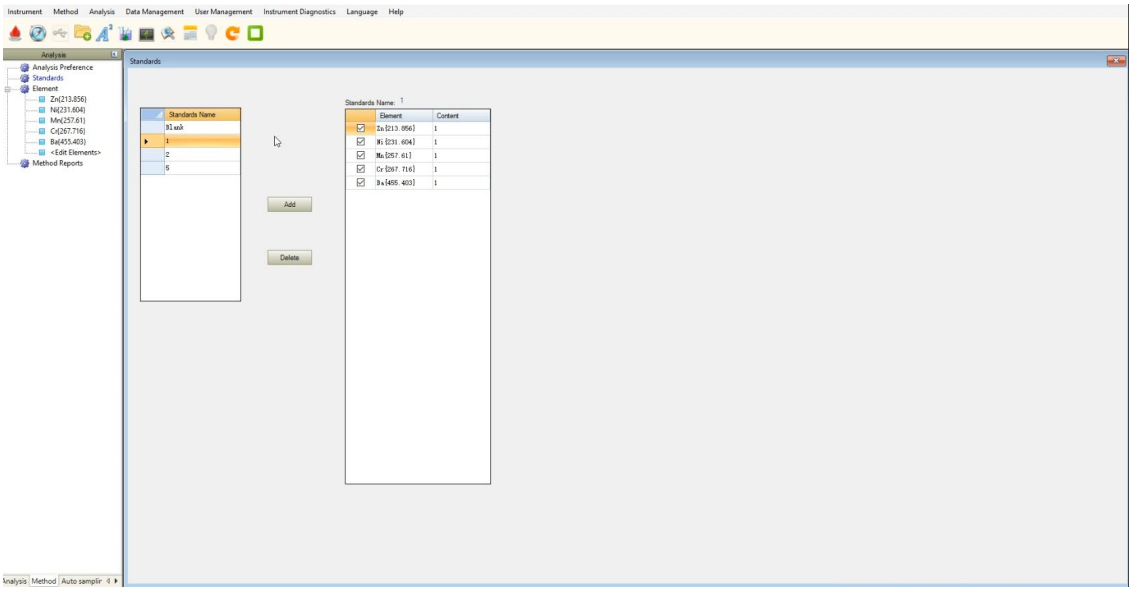


Figure 5.14 Analytical and measurement interface

5.4.1. canonical measure

5.5. Select the measurement standard sample in the drop-down box, click "Analysis standard", and the standard measurement is imminent. The real-time measurement map, single measurement data and measurement average data are displayed in the data present window (see Figure 5.15).

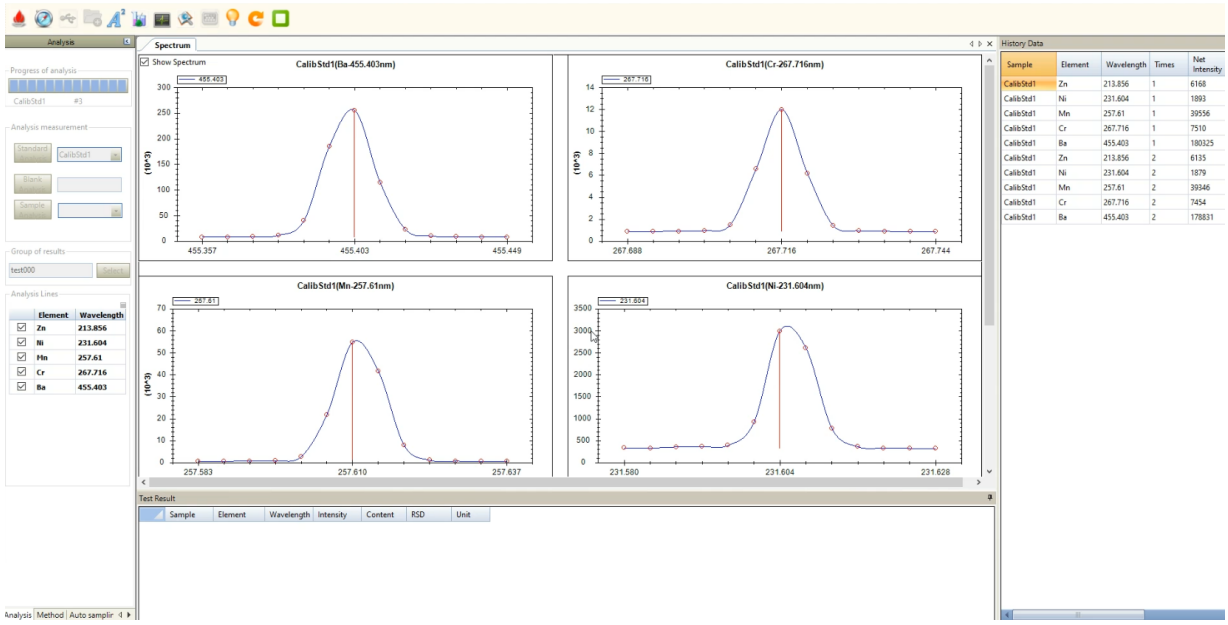


Figure 5.15 The Standard Test Interface

5.5.1. standard curve

Line linear relationships and correlation coefficients are viewed through "Methods-> elements-> criteria" to determine if this standard curve is available. If there is any problem, you can add and delete it by checking the check box (see Figure 5.16).

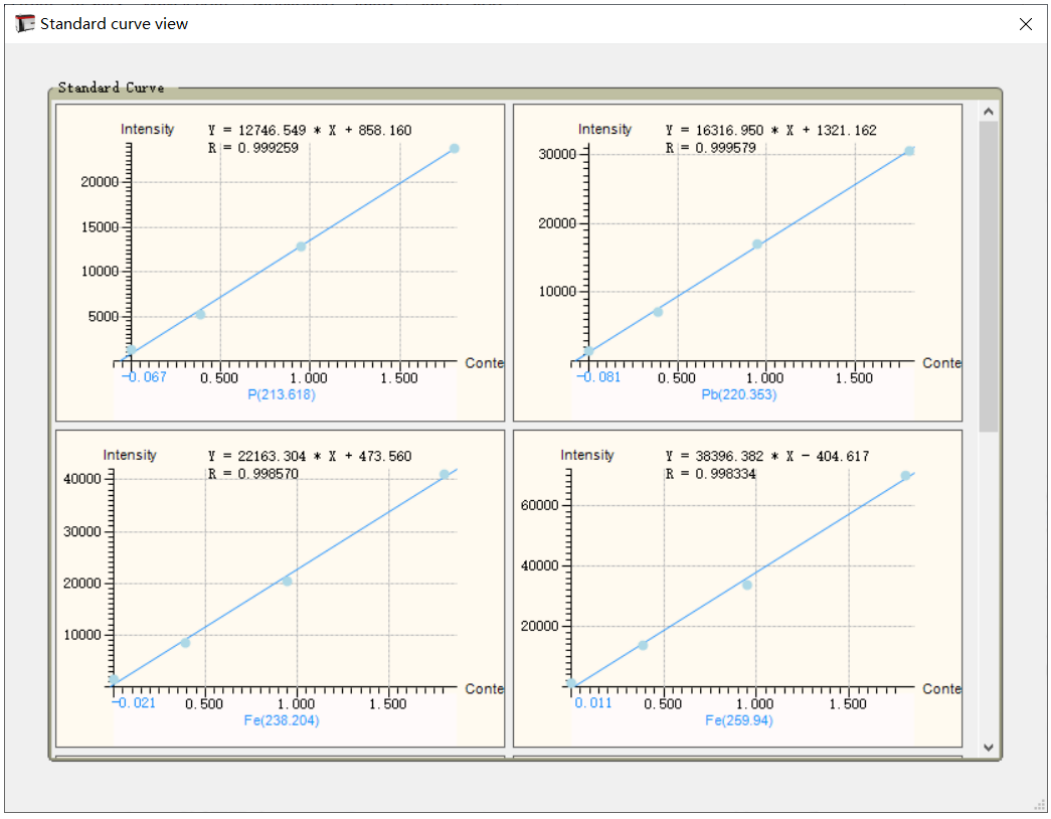


Figure 5.16 Standard curve interface

5.5.2. blank analysis

Click "Analysis Blank" to measure the blank samples. The blank sample name defaults to "B l ank S amp l e1" and can also be manually edited within the text box. Blank measurements can be measured repeatedly, and sample measurements are calculated with the most recent blank measurement.

5.5.3. Sample management

Before the sample measurement, first edit the sample information (click "Analytical Method-> Sample Management"), as shown in Figure 5.17:

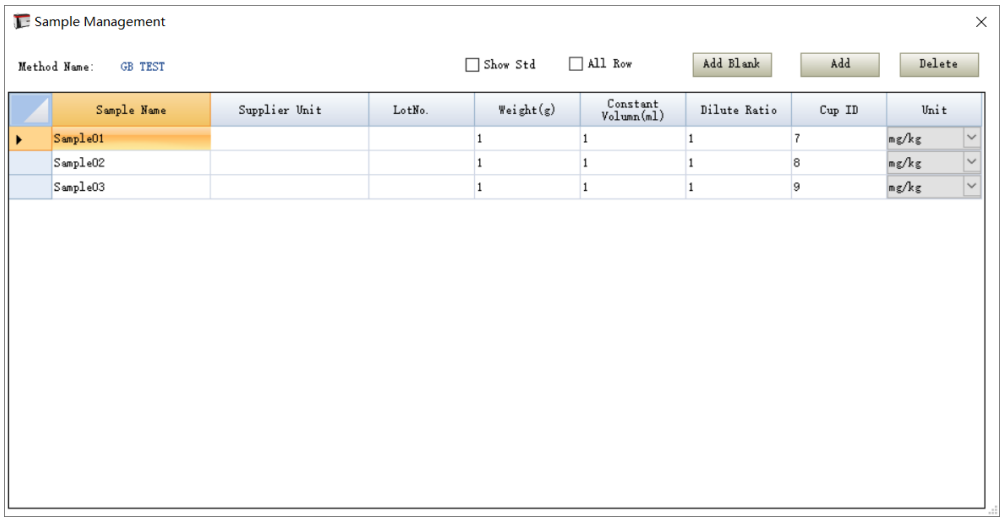


Figure 5.17 Sample management interface

5.5.4. Sample measurement

After editing the sample, all the sample names will be displayed in the "Sample Name" drop-down box. You can select the sample to be measured, and click "Analyze the Sample" to start the measurement. The measurement results will be displayed in the "Data Display Area".

5.5.5. The spectral line calibration

After the measurement, click "Analytical Measurement-> Line Calibration" to calibrate the characteristic line position.

5.5.6. qualitative analysis

Due to the application of photoelectric measurement technology and computer technology in spectroscopy instrument, the qualitative analysis of spectrometer is more convenient. To confirm that an element exists in the specimen, identify three or more sensitive lines of this element in the specimen spectrum.

Click "Analytical Measurement-> Qualitative Analysis" pop-up form in Figure 5.18.

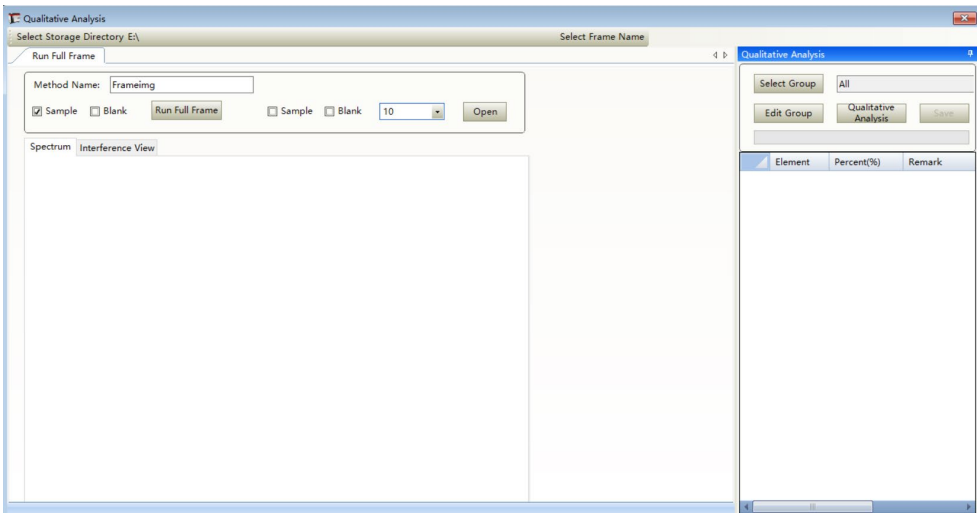


Figure 5.18 Qualitative analysis interface

Method name: Enter the new method name.

Select the directory: click "Select the directory" to select the address of the full file to be stored. It is generally not recommended to store the C disk.

Full shot: tick "sample" or "blank", expose the corresponding full two-dimensional spectrum, and save it to the selected directory above.

Open: tick the open sample or blank, and select the integration time to open the corresponding full-dimensional spectral spectrum. As shown in Figure Figure 5.19.

Qualitative analysis: judge the existing elements according to the two-dimensional spectral map data, and display them.

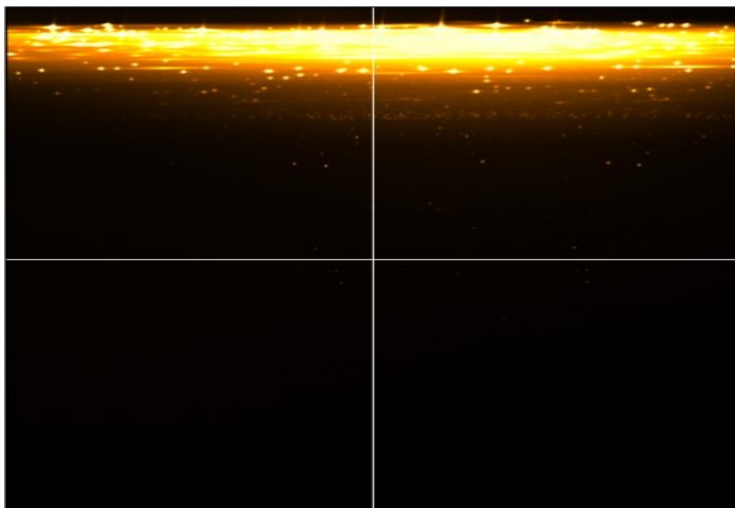


Figure 5.19 Full-amplitude 2 D spectrum map

5.5.7. Full-amplitude management

Click the "Data Management-> Full-amplitude Management" pop-up form as shown in Figure 6.20 to edit the full-amplitude data.

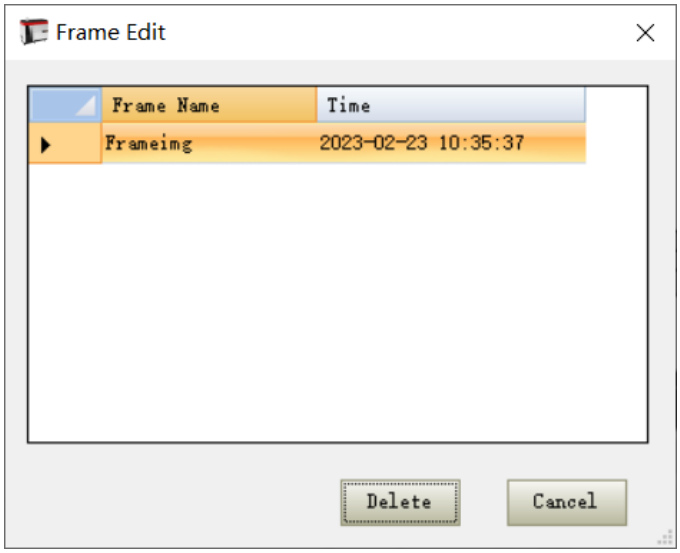


Figure 5.20 Full-amplitude management interface

OK: Select the full amplitude method you want to open, and click OK to open. You can also select a method to double-click to open.
Delete: Select the method and click Delete to delete the full amplitude data.
Cancel: Close the form without any action.

5.6. Data viewing and report output

5.7. The window is shown in Figure 5.21:

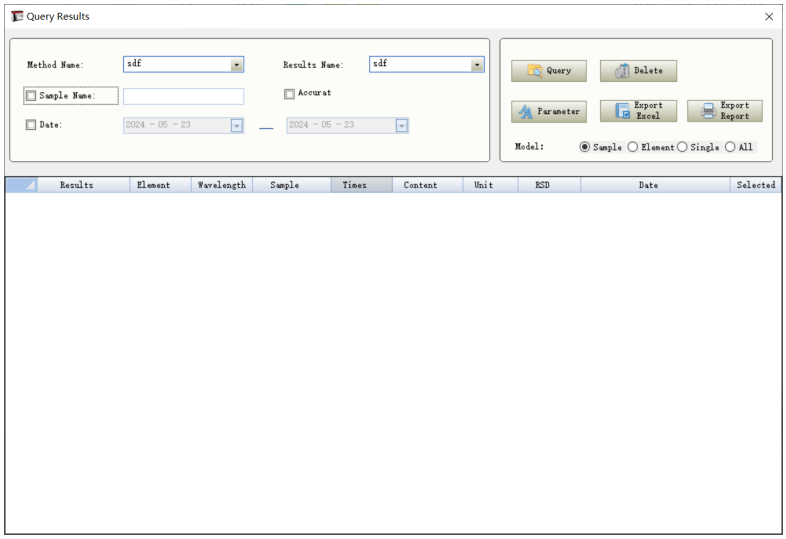
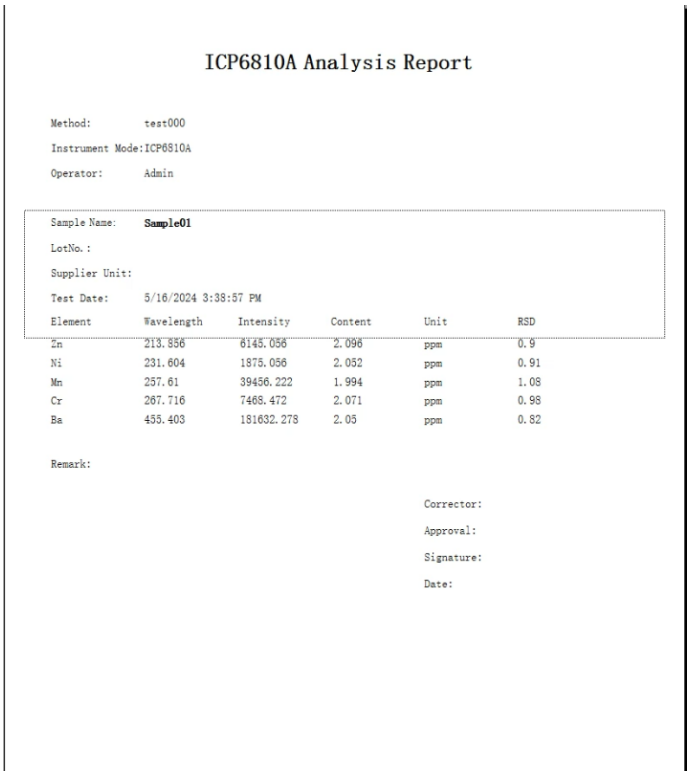


Figure 5.21 Results query interface

Query: Query the data through condition retrieval;
Delete: Delete the invalid measurement result data;
Export the report: select the valid data, export the report (as shown in Figure 6), and also print out;.22
Export the E XCE L: Save to the Exc e l.



ICP6810A Analysis Report

Method: test000
Instrument Mode: ICP6810A
Operator: Admin

Sample Name: **Sample01**
LotNo.:
Supplier Unit:
Test Date: 5/16/2024 3:38:57 PM

Element	Wavelength	Intensity	Content	Unit	RSD
Zn	213.856	6145.056	2.096	ppm	0.9
Ni	231.604	1875.056	2.052	ppm	0.91
Mn	257.61	39456.222	1.994	ppm	1.08
Cr	267.716	7468.472	2.071	ppm	0.98
Ba	455.403	181632.278	2.05	ppm	0.82

Remark:

Corrector:
Approval:
Signature:
Date:

Figure 5.22 Report Preview page

5.8. shut down

5.8.1. flameout

After analyzing the sample, rinse the rinse solution for 5-10 minutes, and click the menu "Instrument Control-> Plasma Control" or toolbar "button" to pop up as shown in Figure 5.24. Click on the stall. 

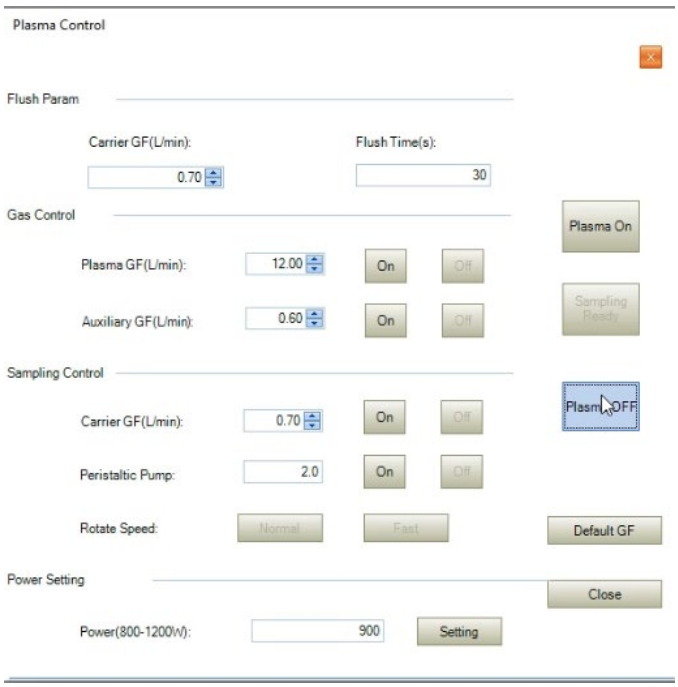


Figure 5.24 Plasma control page

5.8.2. Close the instrument

Turn off the high voltage power switch and wait for 1 minute. Close the argon valve after clicking the Camera temperature with the power supply and AC power supply.

5.8.3. Pine mouth pump clip

5.9. data management

5.9.1. Data reprocessing

Data reprocessing is mainly about reprocessing the measurement data by setting the spectral peak position and width, and the background position and width, to improve the accuracy of the measurement results. Basrix matching is optimal for an ICP spectrometer, but in many cases, is unrealistic. Due to the different composition between samples, between samples and standards, continuous spectra and line tailing, background correction is very important to obtain the correct analysis results. See Figure 6.25, data reprocessing can be divided into three parts (spectrum display, standard curve and data selection for editing). The position of the spectral peak and background can be changed by clicking on the left mouse button.

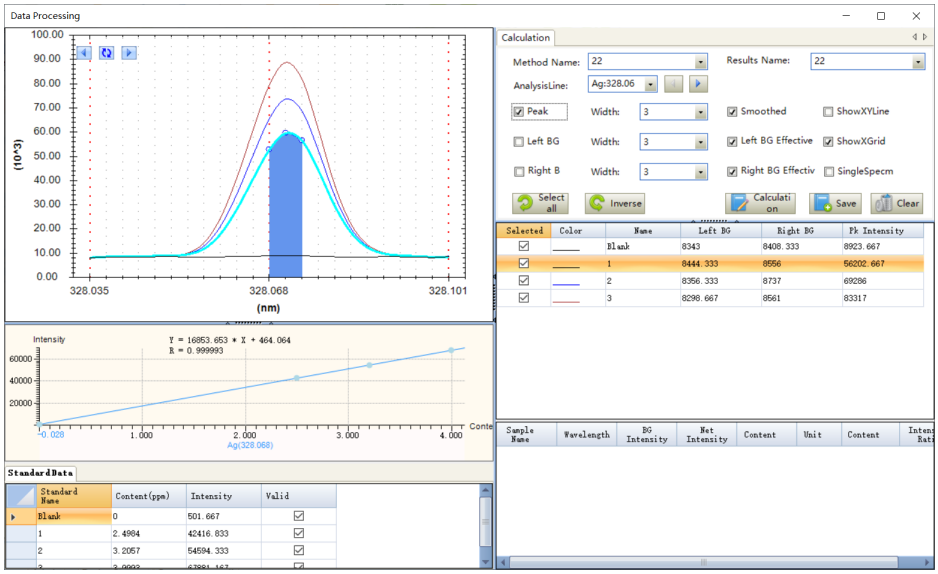


Figure 5.25 Data reprocessing page

Peak setting: select "Show peak", put the mouse on the map position, click the left peak and right peak at the exact peak position (see Figure 5.26);

Right background: select "Right background", put the mouse on the map, click the left button in the correct position, and set it to the right background. Click repeatedly, and the last position is the right background position (see Figure 5.27);

Left background: select "Left background", put the mouse on the map, click the left button in the correct position, and set it to the left background. Repeatedly click, the last position is the left background position;

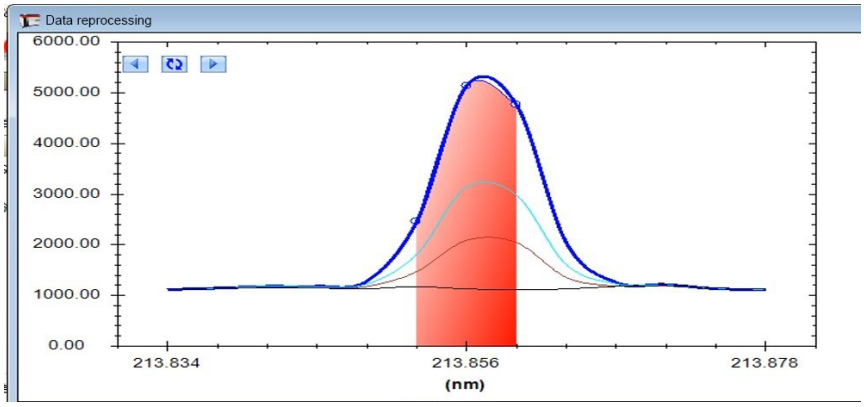


Figure 5.26 Peak position setting page

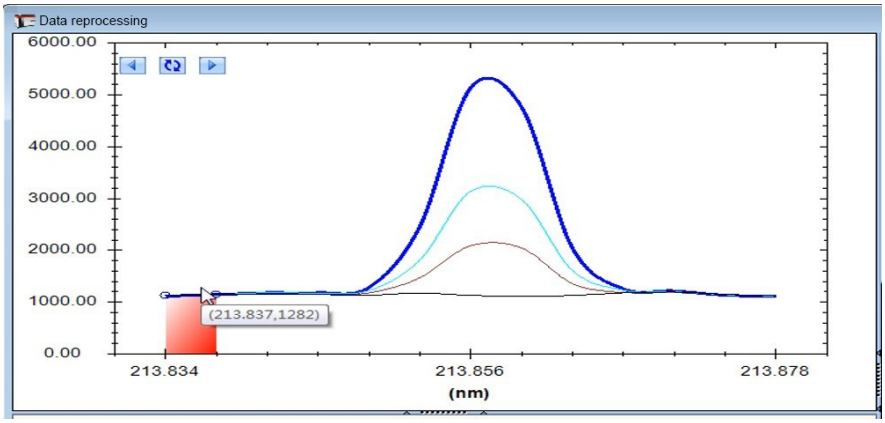


Figure 5.27 Left background setting page

After the position of the spectral peak and background is successfully set up, click "Start calculation" to recalculate the results according to the set background and peak level.

Select the valid data, right-click the mouse, and select "Report Preview" to export the report (see Figure 5.28). Data can also be viewed through Data Management> Result Query.

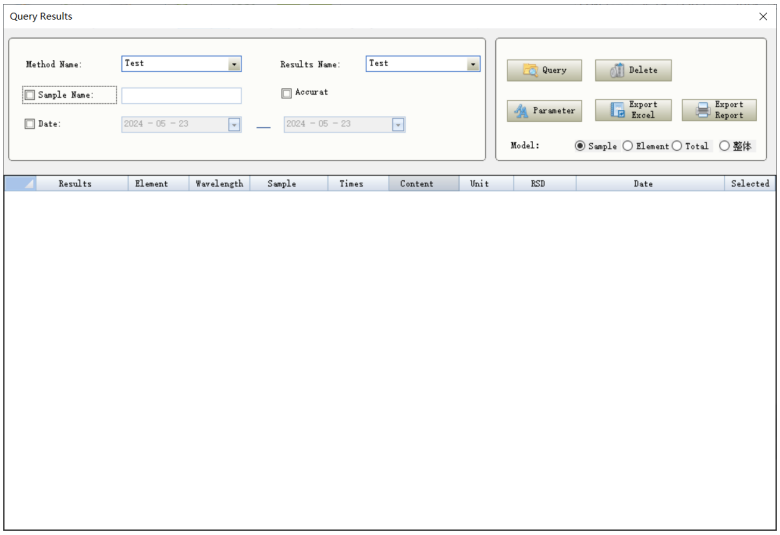


Figure 5.28 Results query interface

5.9.2. wavelength library maintenance

The periodic table provides the addition, deletion, and editing functions of all analysis lines (Figure 5.29).

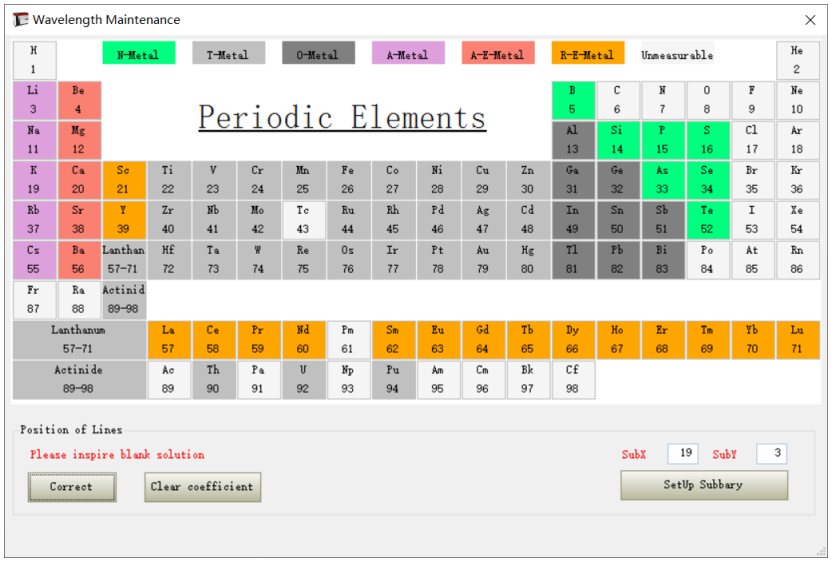


Figure 5.29 wavelength library maintenance interface

Click the left mouse button to enter the editing page (see Figure 5.30)

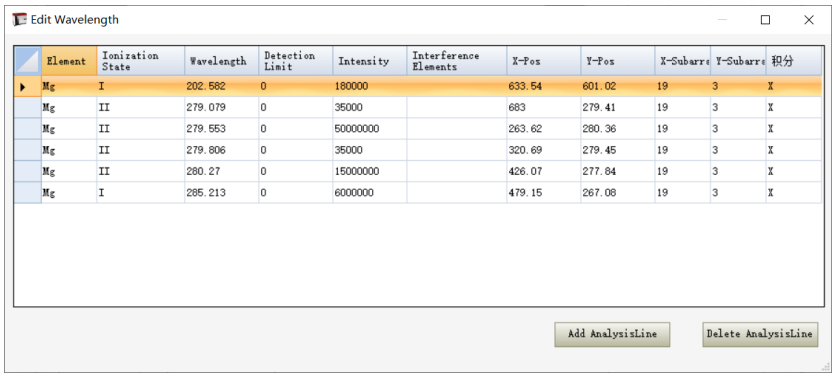


Figure 5.30 wavelength editing page

Add the analysis line: Click the pop-up form as shown in Figure 5.31, select the analysis line to be added, click ">" to move the right area, and click "OK" to complete the operation.

Delete the analysis line: select the analysis line and click "Delete".

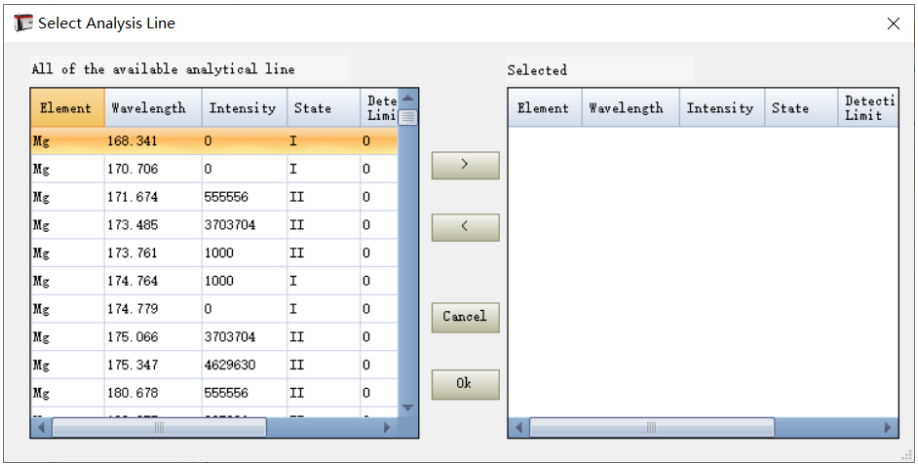


Figure 5.31 Analysis line editing page

5.10. user management

5.10.1. authority management

Permissions are divided into three levels: Administrator, Expert and Operator. Different operation rights can be set for users at each level. This operation is only owned by the Admin.

5.10.2. user management

The administrator (Admin) has operation rights such as adding, deleting user, changing user permission, and changing password, while other level users only have permission to change password, as shown in Figure 5.33.

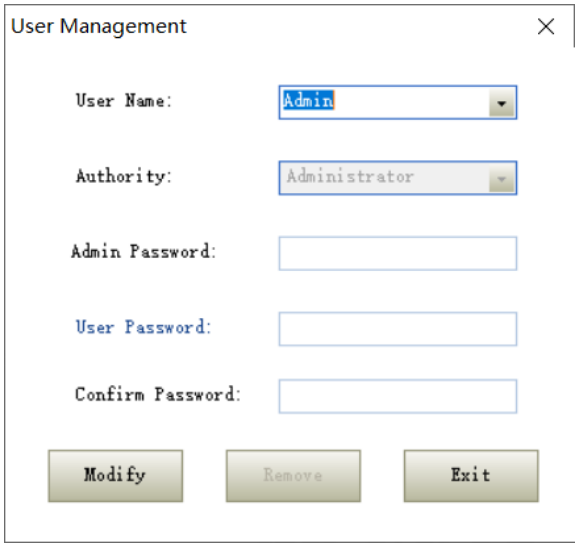


Figure 5.33 The User Management Page

5.10.3. User switch

As shown in Figure 5.34, select the account to be logged in, enter the corresponding password and click "login" to switch between the user.

Figure 5.34, is on the landing page

5.11. language

5.11.1. Language switching

All the languages added above are added as the submenu to the language menu bar of the main interface and can be switched through.

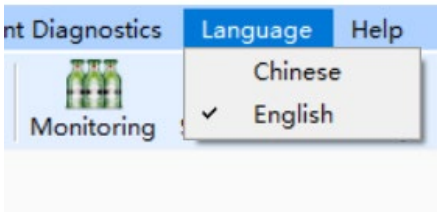


Figure 5.35 Language Switching interface

5.12. additional function

5.12.1. oning of moment tube position

Click "Instrument Control-> Moment Position debugging" to pop up the dialog box shown in Figure 5.36. You can control the torch motor by "up", "down", "left" and "right" to observe the height position and observe the intensity trend in the map (this parameter will be set when the instrument leaves the factory, and the user does not need to change it).

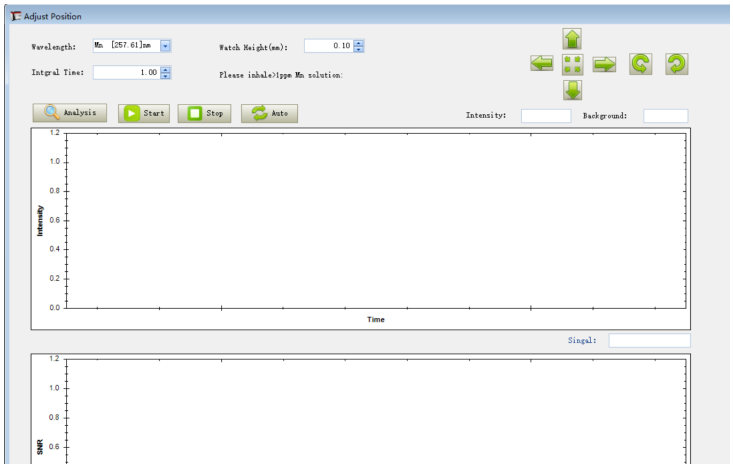


Figure 5.36 Collimation interface

Note: All operations in the auxiliary function are only for the professional engineers.

5.13. help

5.13.1. about

As shown in Figure 5.37, display the software version, ownership and other related information.

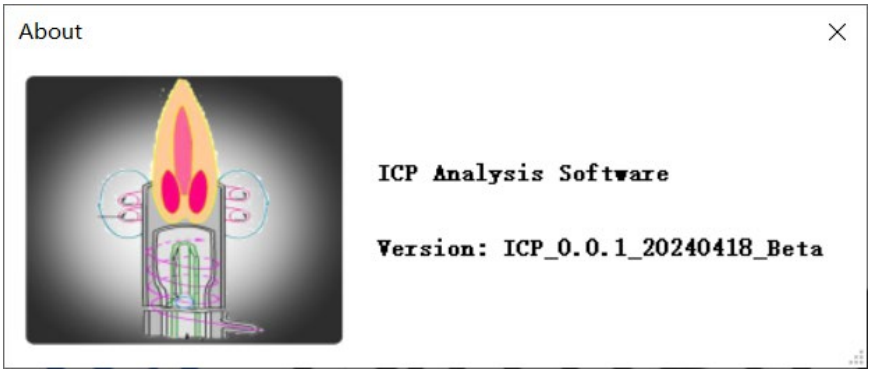


Figure 5.37 Software version Information

5.14. Observational direction switching

5.14.1. switching mode

If you need to switch the observation mode, you only need to directly switch the instrument mode in the software instrument control interface to realize the switch of observation mode.

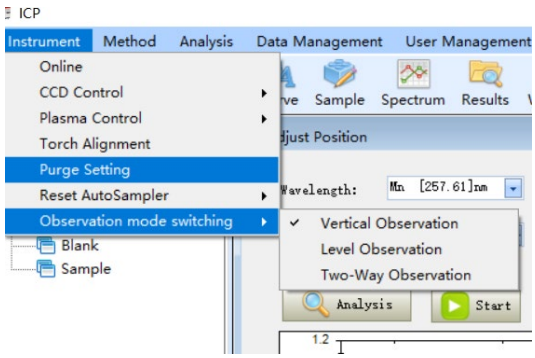


Figure 5.38 Switching of observation mode

5.15. attached map

5.15.1. Flow chart of the software operation

6. Maintenance and maintenance of the products

ICP-6810-A2 is able to analyze sample concentrations from several ppb to several percent. If the analytical environmental conditions are not strictly controlled, it also requires strict maintenance of the instrument in order to strictly control the analytical quality and extend the life of the instrument.

6.1. Cleaning of the laboratory utensils

Often used laboratory utensils, such as beakers and volumetric bottles, should be cleaned before use. Polytetrafluoroethylene (PTFE) and borosilicate glassware can be washed with soap or detergent, washed with water, and then soaked in (1 + 1) HNO3 for 24 hours (or boiled). Wash with water and wash with deionized water (three times). Some glassware oil is serious, can be washed (concentrated sulfuric acid plus potassium dichromate preparation) after washing, and then fully rinse with water.

6.2. Use and maintenance

6.2.1. environment

This instrument requires that the room temperature is generally maintained at a fixed temperature between 20 and 25 ° C, and the temperature change should be less than ± 1 ° C. Indoor humidity should be less than 70%, the best control between 45%~60%, and equipped with air purification device.

6.2.2. power supply circuit

In order to ensure the safe operation of the ICP instrument, the power supply line must have a large enough capacity, otherwise the voltage of the line will be too large when the instrument runs, which will affect the life of the instrument. Refer to the Instrument Installation Conditions for specific requirements for the circuit environment.

6.2.3. dustproof

Laboratory need to use exhaust fan, eliminate the heat of the instrument and working toxic gas, laboratory and external pressure difference, laboratory produce negative pressure, outdoor air containing a lot of dust from the window gap into the indoor, a large number of accumulation in all parts of the instrument, easy to

cause high voltage components or joint ignition, circuit board and wiring, socket short circuit, leakage and other kinds of faults, therefore, often need to dust removal. In particular, the computer, electronic control circuit, high frequency generator, display, printer, disk drive, etc., regularly remove or open, with a small brush cleaning, and at the same time use a vacuum cleaner to each part of the dust suction. On the photomultiplier tube negative high voltage power line, and the high voltage line and joint of the computer display, but also with gauze stained with a little absolute alcohol carefully wipe away the carbon and dust. After the disk drive and printer remove dust, add a little instrument oil to the mechanical moving parts. The print head of the printer should be removed, swept with a soft brush, and wiped with a flannelette to prevent the pinhole from being blocked by paper scraps, and then adjust a certain printing pressure according to the instructions. For the instrument dust removal, generally by the electronic, instrument repair or computer professional personnel to help, if the instrument use or management personnel do not understand the electronic knowledge, do not understand the structure of the instrument, do not easily touch, in order to avoid accidents, dust removal should be stopped in advance and turn off the power supply before proceeding.

6.2.4. Maintenance of the atomizer

The atomizer is the most fragile and critical part of the injection system, which requires good maintenance and use. To regular cleaning, especially after the determination of high salt solution, the top of the atomizer, the torch tube nozzle will accumulate salt, resulting in poor aerosol channel, often reflects the decrease of the measurement intensity, the reflection power of the instrument. Dust or carbon accumulation on the torch will affect the ignited plasma flame torch and maintain stability, and also affect the reflected power. Therefore, it should be washed regularly, washed, and finally, wash with absolute ethanol and blow dry, and keep the injection system and the torch tube clean.

6.2.5. Reduce the number of start and shutdown in use

Start before determination, must be arranged, do the preparation work in advance, avoid by all means in the same time frequently open, the instrument frequently open easy to cause damage, this is because the instrument at every time open, instantaneous current greatly higher than the normal current, instantaneous pulse impact, easy to cause power tube, vacuum capacitor and other chip damage.

6.2.6. Other matters needing attention

6.2.6.1. Inspection of the incoming and forward sample system;

6.2.6.2. Inspection and cleaning of the advanced test sample system;

6.2.6.3. The waste liquid in the waste liquid bucket should be cleaned up frequently;

6.2.6.4. Torch tube, atomizer, fog chamber cleaning;

6.2.6.5. Regular replacement of cooling water;

6.2.6.6. Please note before each startup: when the plasma gas is less than 1 Mpa and can only ignite for one hour, it is recommended to replace the gas cylinder;

6.2.6.7. After the instrument is ignited, it can not casually adjust the plasma gas flow meter and pressure gauge, otherwise it will burn out the quartz moment pipe;

6.2.6.8. The capillary of the instrument must be placed in the solution. When replacing the solution, the capillary cannot leave the liquid (into air) for more than 10 seconds, otherwise it will lead to flameout;

6.2.6.9. If the quartz moment tube is dirty, please clean in time;

6.2.6.10. Disassembling moment tubes, atomizer, and fog chamber (quartz glass products are fragile).

7. Fault analysis and troubleshooting

The following is for our remote assistance. If you encounter any faults during the use process, you can refer to the following content, and contact us at the same time. We always hope to solve the problems you encounter in the shortest possible time.

7.1. Software failed online

1. Check whether the network cable is in good contact;
2. Check whether the instrument is powered on.

7.2. Ignition failed

1. Check whether the cooling water tank is open and the water pressure is normal (not less than 0.1MP a); if the relay suction sound is not heard during the ignition process, that is the reason.

2. According to the software prompt, check to see if there is a hint of insufficient airflow. If indicated, please check the gas route as indicated and replace the gas cylinder if necessary.

3. Check whether the point torch is connected to the moment tube.
4. Check whether the injection tube has been inserted into the solution to form a liquid seal.

7.3. Click in the sample to prepare for the fire extinguishing

1. The injection tube has no liquid seal;
2. The gas pressure is too large, generally limited to 0.2MPa-0.3MPa. Please check the cylinder pressure to confirm that the pressure is within this range.

7.4. Intake tube bubbles

This phenomenon is caused by the melting in the central channel of the moment tube. Cause the central channel burning