Operation Manual

Atomic Absorption Spectrometer

AE-AA4530F

Contents

Chapter 6 Background-Corrected AA

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Chapter 1 Safety Information

Introduction

The guides provided with your analytical instrument contain information and warnings that you must follow to ensure safe operation and to maintain the instrument in a safe condition.This advice is intended to supplement,not supersede,the normal safety code of behavior prevailing in the country of operation.

General safety practices for atomic spectroscopy and potential hazards with various atomic absorption techniques are described in the *User's Guide* for the atomic absorption spectrometer.Please refer to that guide before you operate the system.

The information provided does not cover every safety procedure that should be practiced.Ultimately,maintenance of a safe laboratory environment is the responsibility of the user and the user's organization.

Correct use of analytical instruments

Before you install or use your instrument,and in order to get the best results,you should be familiar with all of the instruments in the system and know how to operate them.You should also be aware of the safety procedures in force in your laboratory,especially those concerning atomic spectroscopy instruments.Read the guides supplied with the instruments before you start.

If you use the instrument in a manner not specified in the guides,or if you use it for a purpose other than that intended,you man damage the instrument,or compromise your own,or someone else's,safety.

Analytical instruments should only be operated by persons who are suitably qualified and have received adequate training.

Warning Messages

1. Only a Jingke service engineer or similarly trained and authorized person should be permitted to service the instrument. Do not attempt to make adjustments,replacements,repairs,or modifications to this instrument except as described in the documentation supplied with the instrument.
2. Be sure there is no fire in the laboratory in where the instrument locate and the atomic absorption spectrophotometer and acetylene cylinder can not locate in the same room
3. Before ingiting the flame,always make sure that :
   ·The fume ventilation system for the laboratory is switched on.
   ·Acetylene flow can not exceed 3L/min
   ·Acetylene cylinder output pressure can not exceed 0.12Mpa
   ·The burner head is correctly installed and the end cap is secured.
   ·The correct nebulizer is fitted and that it is correctly secured.
   ·The correct gaskets are fitted in the burner system.
   ·The fuel and oxidant hoses are correctly fitted to the burner system.
   ·The drain system is installed and operating correctly.
   ·The door of the atomizer compartment is in the closed position.
   ·All safety interlocks are correctly closed.
4. The burner head can reach very high teperatures. Do not touch the burner head until it has cooled to room temperature.
5. To extinguish the flame:
   ·Shut down the gases to the spectrometer at source.
   ·In the Flame Control window,click on Bleed Gases to depressurize the gas lines.

Chapter 2 Overview

Atomic absorption spectrophotometer is a single beam instrument controlling and processing data through PC and special procedure for testing constant,trace metal element and semi-metallic element content of various substance

PC, and its s for control and data processing function of for the determination of the constants of various substances, trace, s and content.

There are three kinds of reading mode--continuous, peak height and peak area for testing absorbance, concentration and emission intensity.There are three signal mode-- atomic absorption, background absorption and background correction.The integration time is optional from 0.1 to 60 seconds. Can set lamp current, negative high pressure, operating wavelength and combustion condition through the menu of PC. With automatic gain, background correction, automatic balancing of energy, wavelength scanning, and automatically finding the peak function. All the reading, the measurement result, calibration curve and operating condition can be printed by the printer.

Provide standard concentration calibration from 1-9point, the slope can be re-adjusted with a single standard sample, with linear regression, curve fitting, linear and nonlinear standard addition method, the baseline compensation and the average value,relative standard deviation and other functions.

The instrument can meet the requirements of the industry standard of Q / SGVH 1-2006.

Chapter 3 Installing and Commissioning

Laboratory

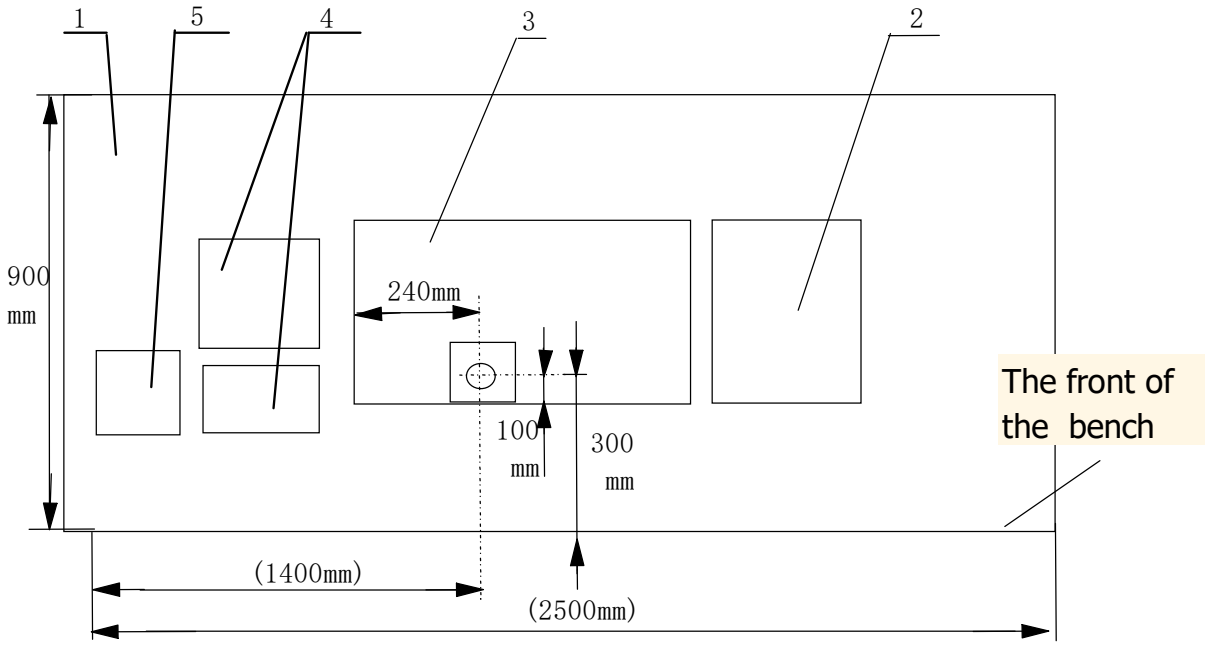
Atomic absorption spectrophotometer should be put in a clean lab, no corrosive substance, the indoor temperature should be maintained at 10 ℃ ～30 ℃, relative humidity less than 85%.

Bench and the fume ventilation system

Bench should be firm,shockproof and flat,and have a hole of 8-10cm in diameter for the installation of drainage pipe. Refer to Figure 3-1 (A), when placing bench,system and optiona, Figure 3-1 (B) when placing ventilation equipment.

An entrance over 0.6 meter wide should be keep for one person can enter to maintain.

In addition, to protect the health of the operator and extend equipment's life a ventilation equipment should be equipped about 30cm at the top of the combustion chamber to timely discharge noxious smoke,smog and corrosive steam flame discharged.Stainless steel is better, which size is shown in Figure 3-1 (B) below:



1. Bench 2. power supply of graphite furnace (optional)
3.AAS host 4. PC 5. Printer

Figure 3-1 (A) size of bench

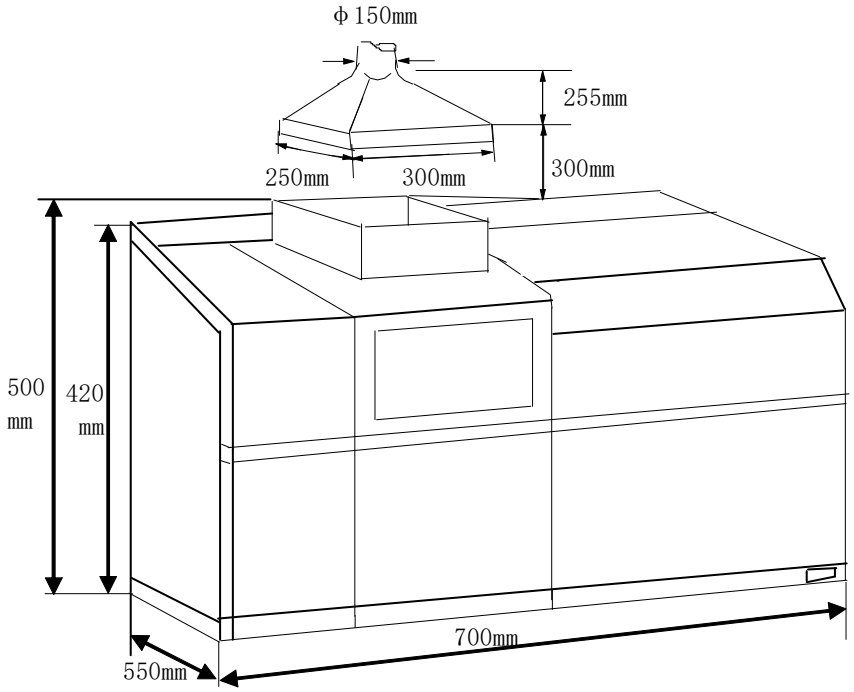


Figure 3-1 (B) Schematic diagram of ventilation equipment

Power, gas and water supply

220V ± 22V, 50Hz single-phase AC power is needed, the earth terminal should be well grounded. At least eight outlets to be installed (250V/10A three-pin socket) for the using possibility of the host system, air compressors, various accessories and maintenance tools wiring board should be installed in a place near the bench.

A group of single-phase AC power supply-220V, 30A, 50Hz should be added with the use of graphite furnace which should be led from the distribution box and can withstand the maximum load with three-core socket 250V/30A in order to not interfering with the host system. Cooling water tap water or circulating cooling system can be chosen and outfall are needed in the laboratory, flow rate is no less than 2L/min. Air compressor equipment should be a few meters away from the instrument and be put in a well ventilated, clean place and connecting plastic pipe should not be close to the heat source. Acetylene cylinder with tempering device is prepared by user which must be placed in a well-ventilated place,fire is forbidden within three meters to avoid burning and blasting accident.

The front and the back view of the host

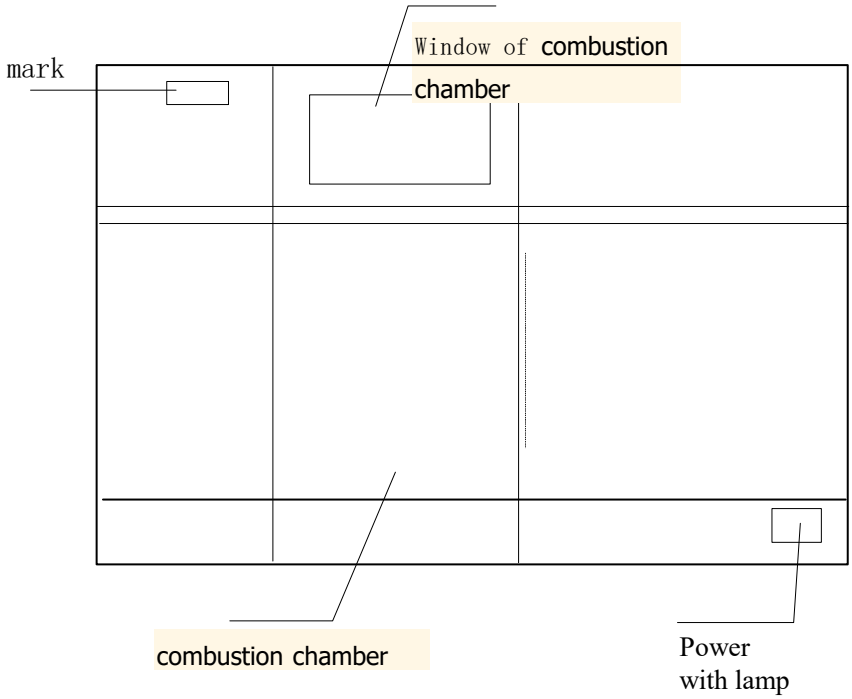


Figure 3-1 (C) the front view of the host

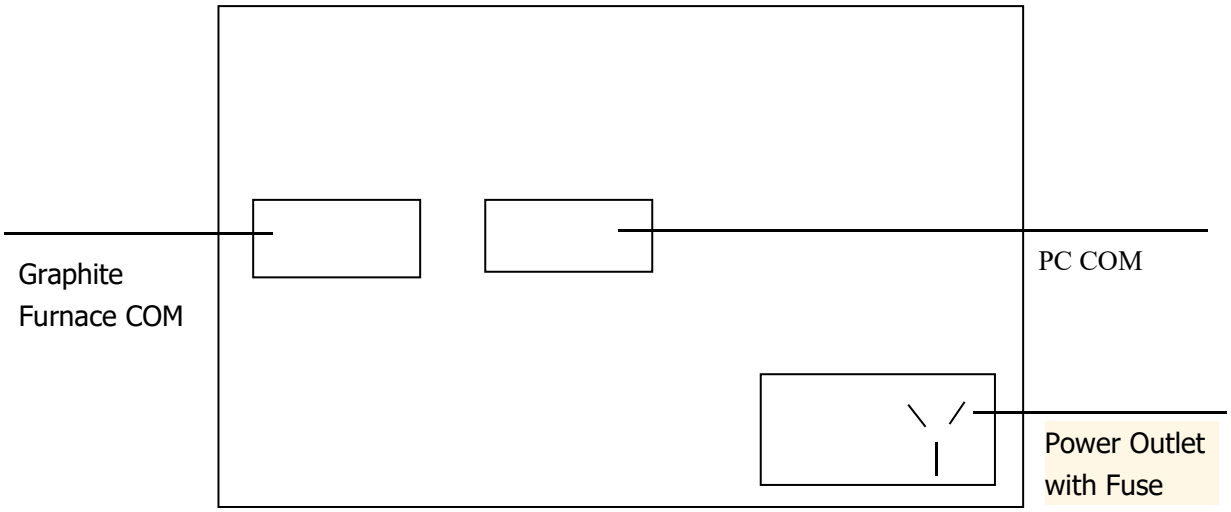
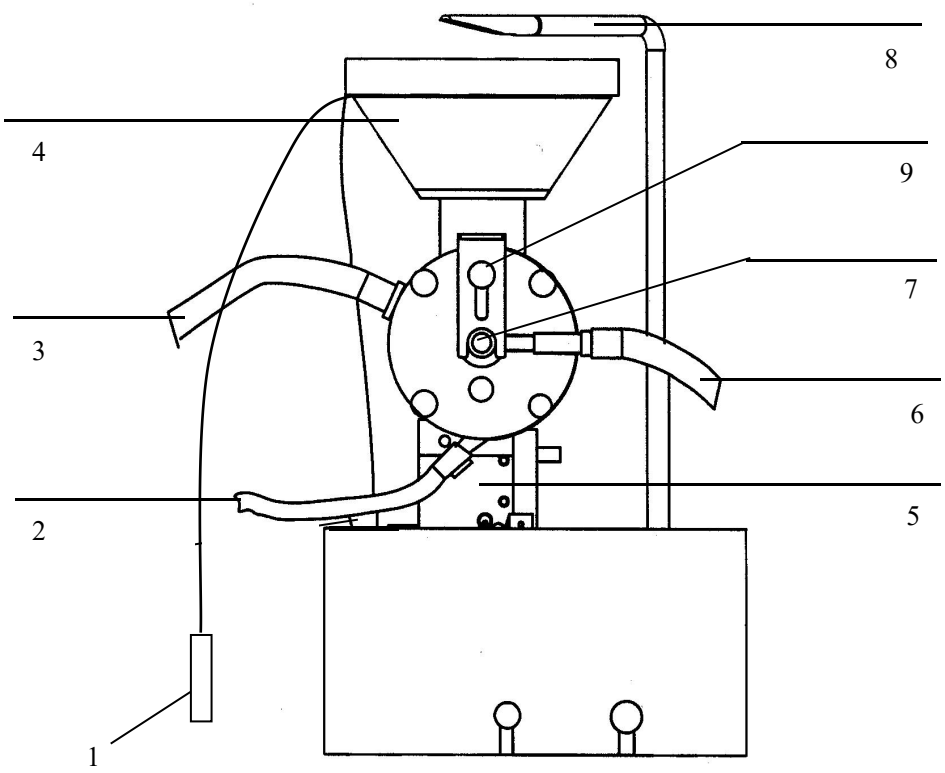


Figure 3-1 (D) the back view of the host

Installing

Installing the host

The instrument should be placed on a smooth and vibrationless bench, a ventilation equipment should be placed on the top of the, a small hole in the bench should be on an appropriate place under the combustion chamber (Refer to Figure 2-1A)



1. Safety interlock and identification head for testing 2. Drain Tube 3. Mixed trachea
4. Combustion head (50mm or 100mm) 5. Automatic lifting platform 6. Atomization tube
7. Atomizer 8. Igniter 9. tablet

Figure 3-2 combustor

A suitable length drain pipe should be installed in the outlet pipe of in the premixed chamber,the other end of the drain pipe go through and equipment through the burner floor,the long round hole of the floor of the instrument and the round hole in the bench.

Put the base cover of the premixed chamber on the automatically lifting platform of the burner,tighten it with the fastening screw on the base cover

3. install the 100 mm (or 50 mm) slit burner on the neck of the premixed chamber, and insert security chain latch into bolt hole before using the gas

4. Ring the waste water pipe under the bench as 100 mm diameter ring and fix it with the line, insert the end cap discharging waste water into the plastic waste container. (Note: The pipe can not be folded or twisted).

5. Connect the trachea on the left of the combustion chamber to the premixed chamber,tighten with your fingers, then tighten with a 10mm wrench.

Installing the Nebulizer

A: Installing the glass nebulizer

1. loosen the screw in the end cap and lift tablet.

2. Insert the glass nebulizer into the port in the end cap, compress the tablet screw.

3. Connect the nebulizer tube on the right of the combustion chamber to the entrance of gas, tighten the nut with hand, then tighten it with the 10mm single wrench

4.Set the polyethylene capillary into the metal capillary at the entrance of the nebulizer

B: Installing the stainless steel nebulizer

1. Remove the front end cap of the premixed chamber.

2. Insert the ball into the adjustable rod of the end cap so that the center of the ball can align the center hole of the end cap and finally tighten it with nylon screw

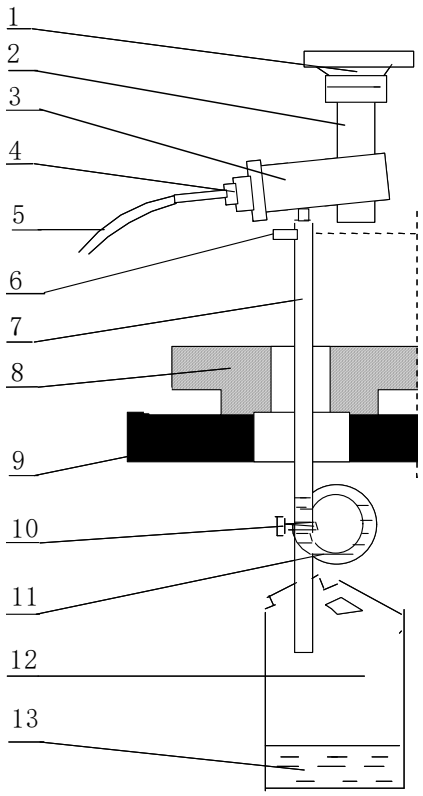
3. Set the polyethylene capillary(φ1.2×0.3，150～200mm) into the metal capillary at the entrance of the nebulizer

4. Lift the tablet and put into the metal nebulizer, press down the tablet and tighten the screw

5. Connect the nebulizer tube on the right of the combustion chamber to the entrance of gas, tighten the nut with hand, then tighten it with the 10mm single wrench

Adding water to the drain trap

After the installation of the premix chamber, the combustion chamber, nebulizer and waste water drainage system, remove the burner head,pour about 400 ml water slowly through the neck(as shown in Figure 2) of the spray chamber to fill the drain trap and activate the drain float(as shown in Figure 3-3).Reinstall the burner head.



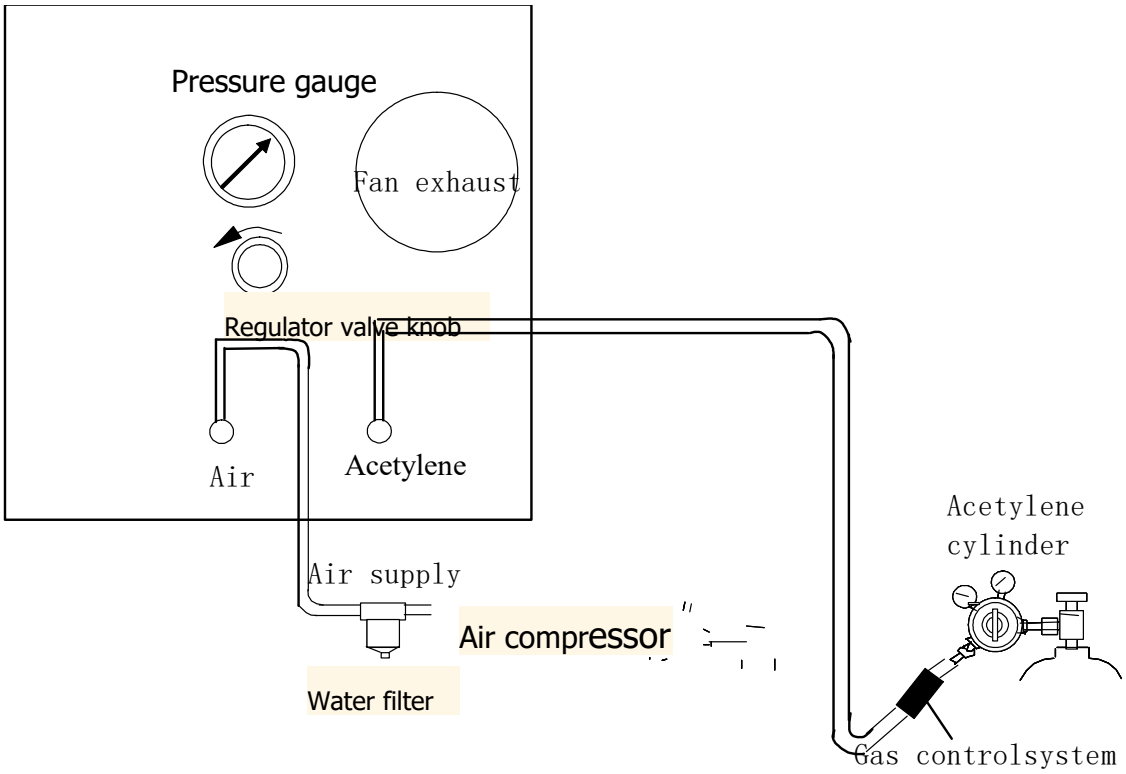
1. Combustion head 2. Premixed chamber neck 3. Premixed Room 4. Atomizer
5. Injection capillary 6. Base plate of combustion chamber 7. Drain pipe
8. massive base plate 9. bench 10. Banding 11 . Plastic ring for adding water
12. waste liquid container 13. waste liquid

Figure 3-3 drainage system of premix chamber

Warning: The procedure should be checked before each ignition!

Installing the gas lines

Joint of gas tube is in the back of the instrument, as shown in Figure 3-4.



Fifure 3-4 connection of gas system

1. Connect one end of the air tube (φ6 × 1 nylon tube) with the "air" entry and connect the other end with the output entry of the oil-free air compressor through the manifold air filter

2. Connect the acetylene tube (φ6 × 1 nylon tube) with the"acetylene" entry and connect the other end with the clean acetylene gas source

Warning

1. Understand the gas source, never make wrong

2.Tighten the connection nut to avoid leakage.

3. Do not use the copper tube in which copper copper content is more than 65% to connect acetylene gas path and do not use the tube which has oil to connect gas path for avoiding spontaneous combustion and explosion

Installing and Removing the Chimney

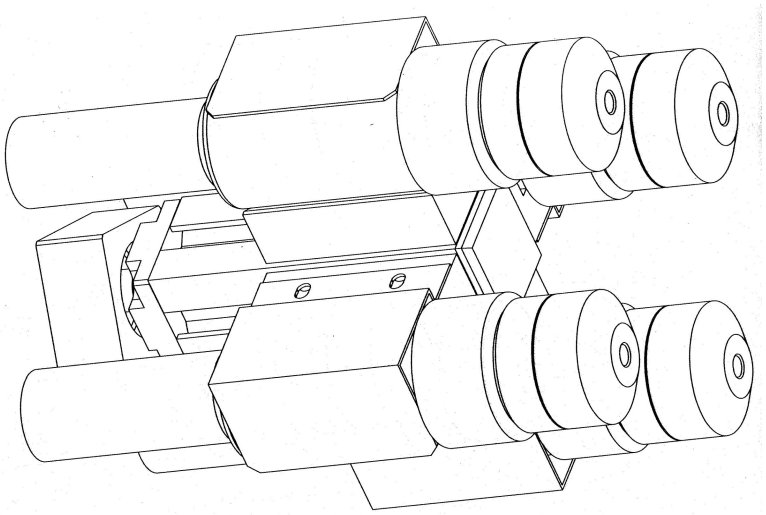
The upper burner chamber with a chimney can be removed from the instrument. Bring it up,in contrast it can be reset.

Installing Hollow Cathode Lamp

Lamp room is at the right top of the instrument. Four hollow cathode lamps can be installed on the lighthouse (Figure 3-5), thus a lamp is in a test state and other lights can preheat. Turn the lighthouse so that all the lamps can get to the test position controlled by the AA workstation software, and then fine-tune to the optimum position

Procedure:

1. Insert the hollow cathode lamp into the lamp socket
2. As shown in Figure 3-5, put the lamp on the lamp socket.
3. Correcting the light source(see page 4-2)



1. Rotating lamp holder 2. lamp 3. Platen 4. Lampholder

Figure 3-5 Parts of lamp holder

Connecting cables at the back of the instrument

1. RS232 interface

Connected with the workstation, controlling and processing data.

2. Graphite furnace communication port

Connected with the graphite furnace controller,controlling the temperature of the graphite furnace

3.Connecting the power cord

After these connection, when the power switch of the host and the computer in the off position connect the power cord. See Figure 3-1 (D)

Chapter 4 Software Guide

Switching on the system

1.Start the Computer

2.Click on “AAS”icon twice,open the workstation,it start self-test (Figure 4-2)

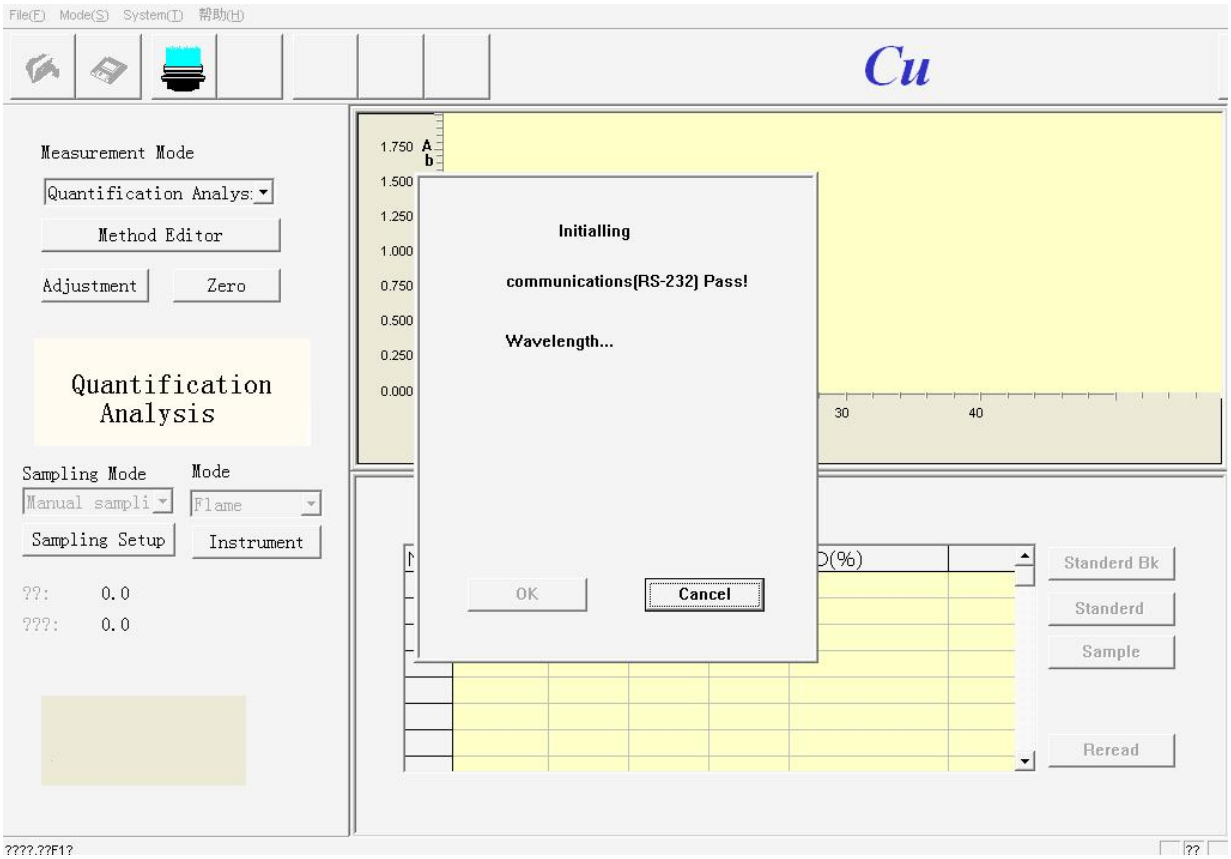


Figure 4-2

NOTICE If you need to see stored measurement result in the offline state, then click on the cancel button after starting workstation, close the self-test dialog box, then you can use the data file.

If you want to host online again, restart your workstation.

3. after the self-test the following is shown in Figure 4-3.

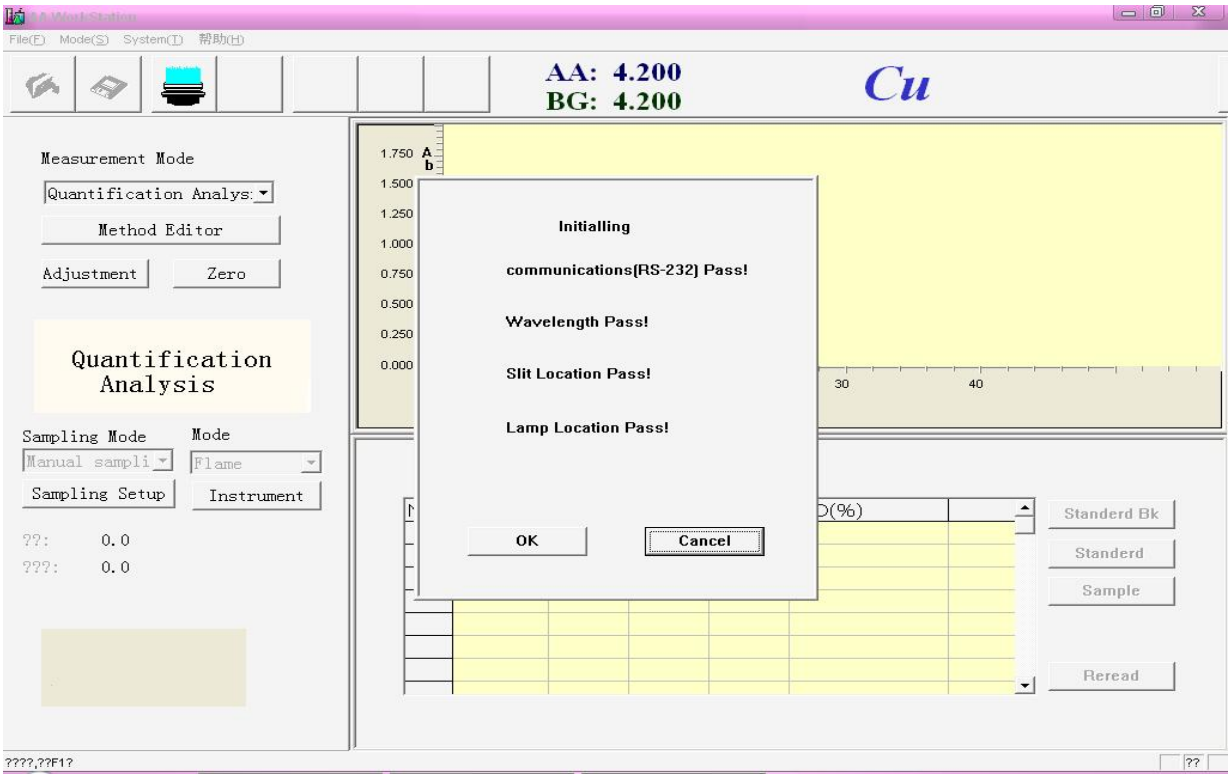


Figure 4-3

4. Click on 【OK】 button, display the following shown in Figure 4-5.

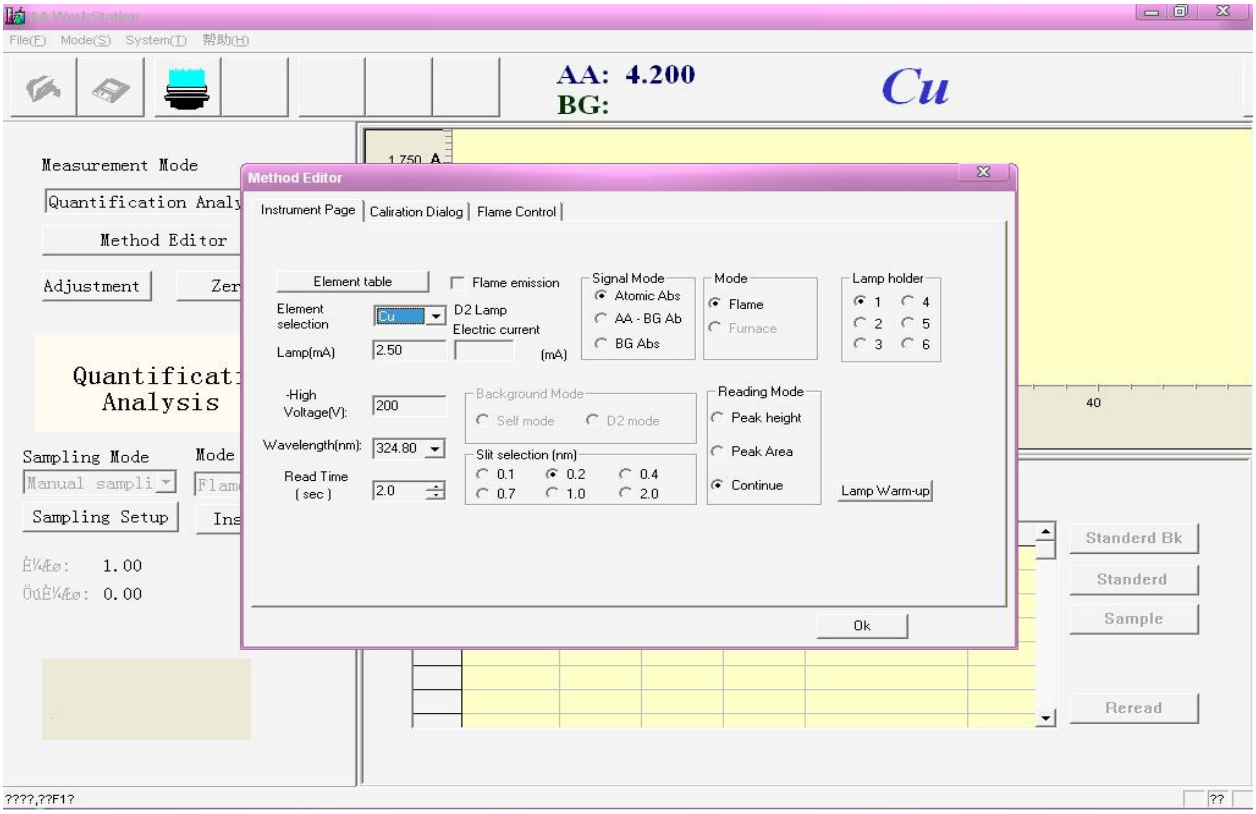


Figure 4-5

The user can select corresponding testing condition and method according to their own requirements.

Introduction of the application window

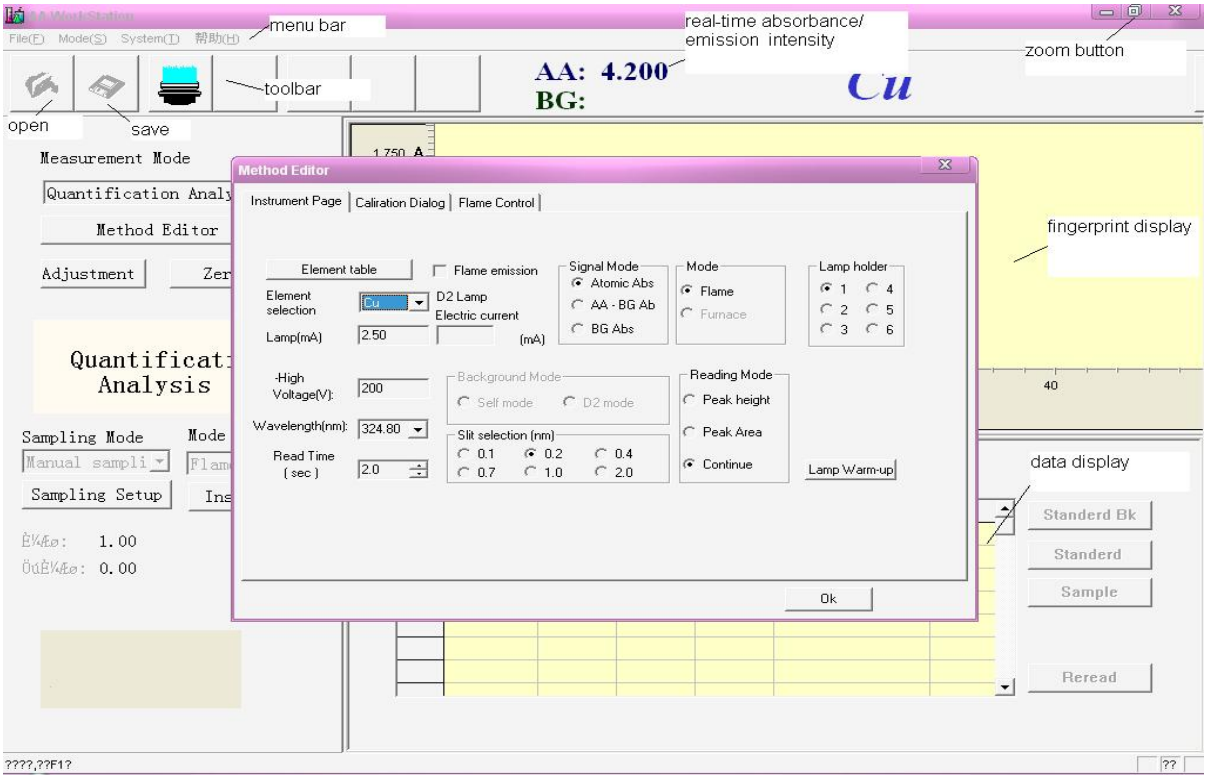


Figure 4-6

Setting password of the workstation

a.Select the System / system info in the menu bar, as shown in Figure 4-7, the dialogue box is shown in Figure 4-8

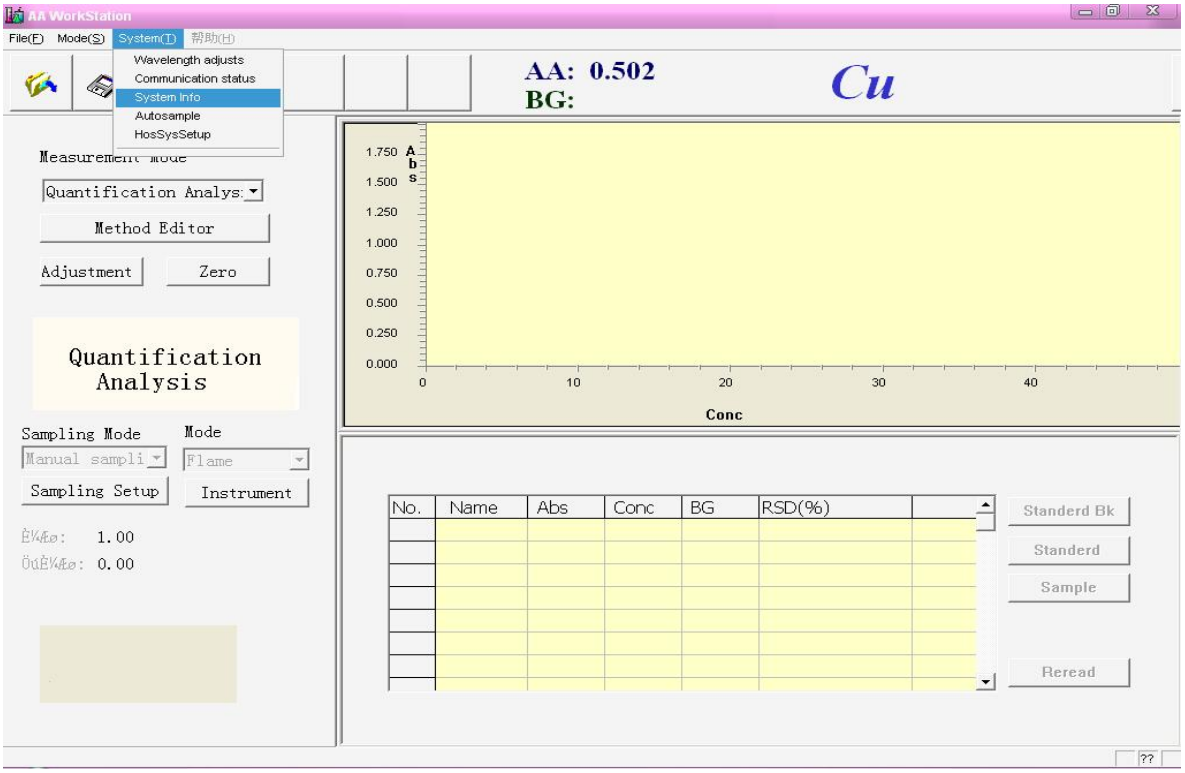


Figure 4-7

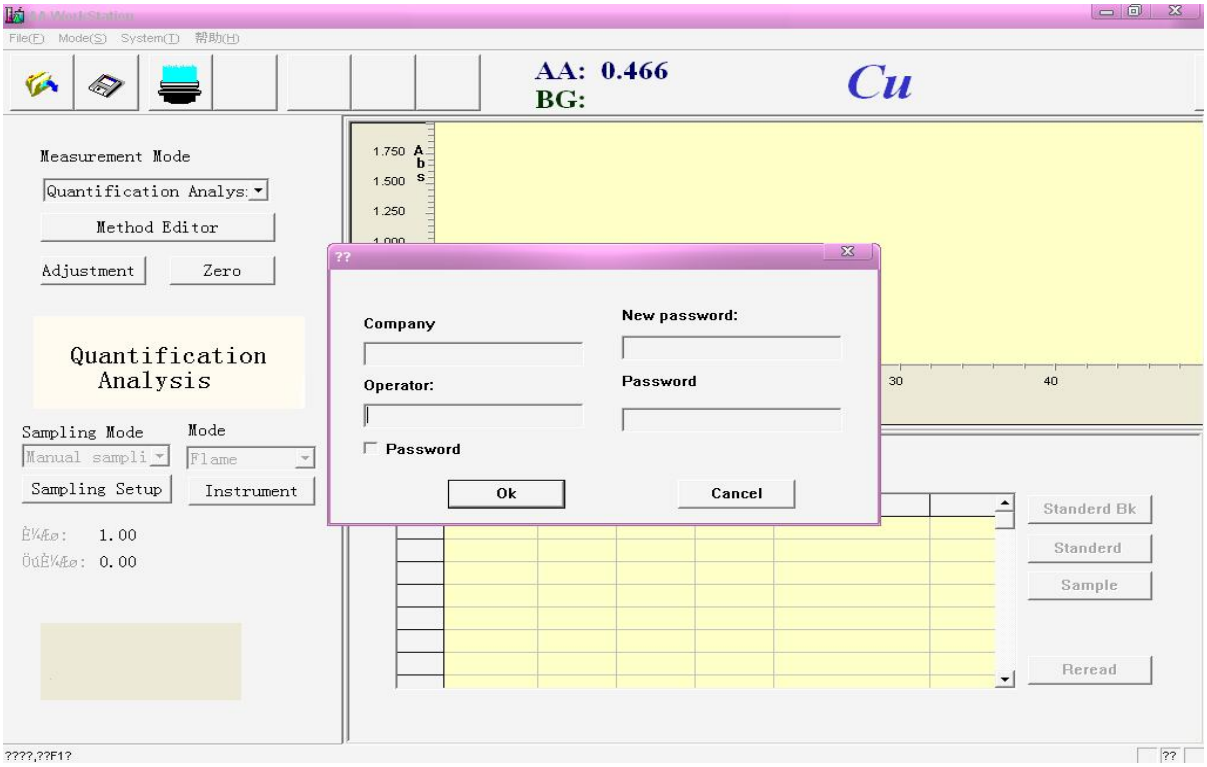


Figure 4-8

b. Select the " password" dialog box, enter a password, and enter again to confirm. Figure 4-9.

c.click on ok button,complete the password setting

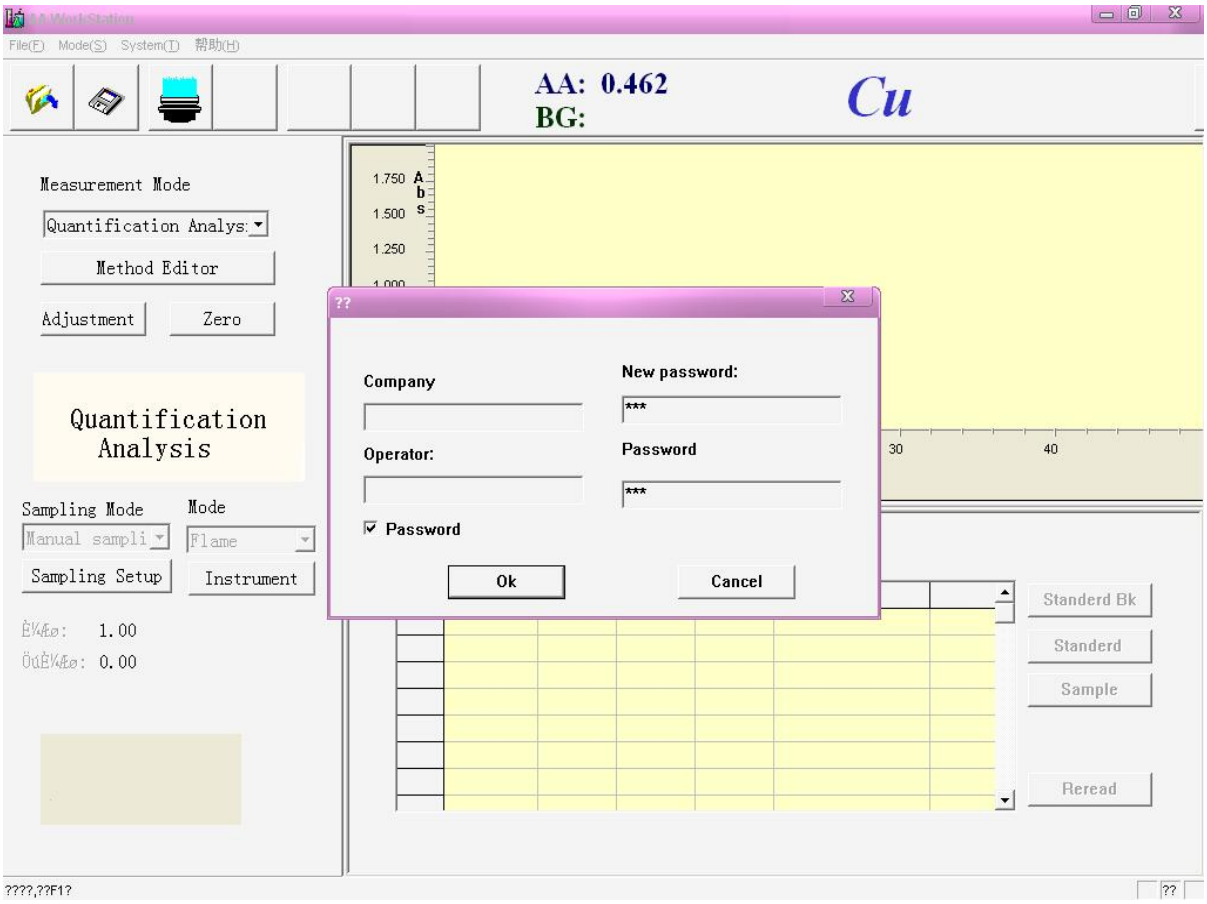


Figure 4-9

d. The dialog box (Figure 4-10)will appear when open workstation, enter your correct password, press

【OK】 button, the instrument begin to self-test.

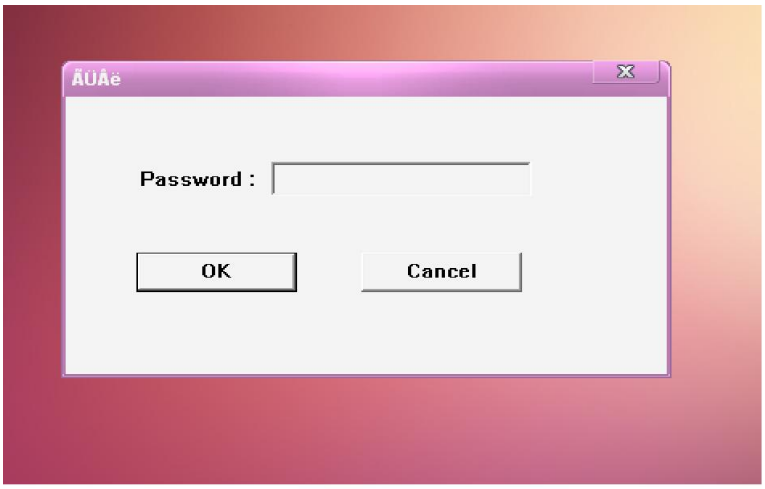


Figure 4-10

NOTICE The User can set password of AAS workstation according to their own need. If you forget the password, please re-install the workstation software.

Introduction of Method Editor Window

"Instrument Page","Caliration Dialoge", "Flame Control" or "Graphite Furnace Control" are in the window,Figure 4-11

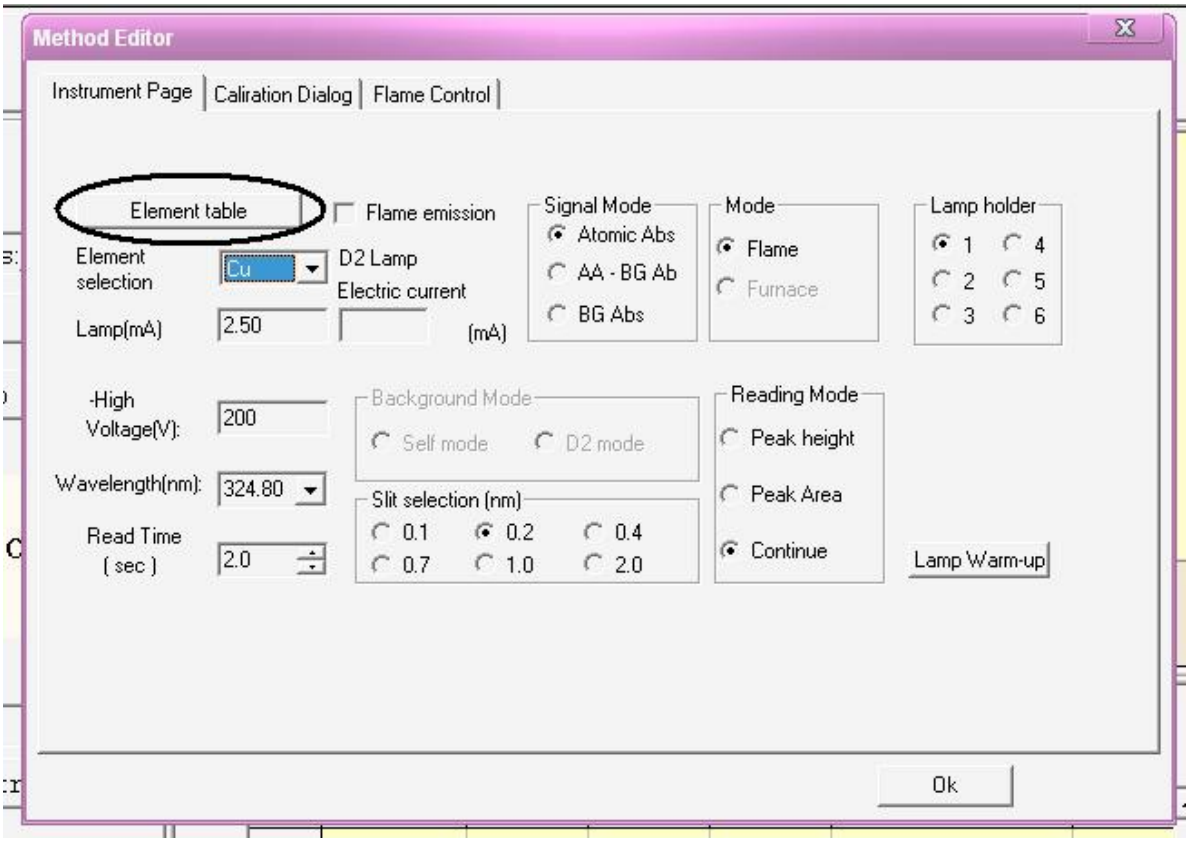


Figure 4-11

Parameter settings window

1.Choosing element. There are two methods to check element, one is click on the 【Element Table 】 button (Figure 4-11), pop up a element table (Figure 4-12).

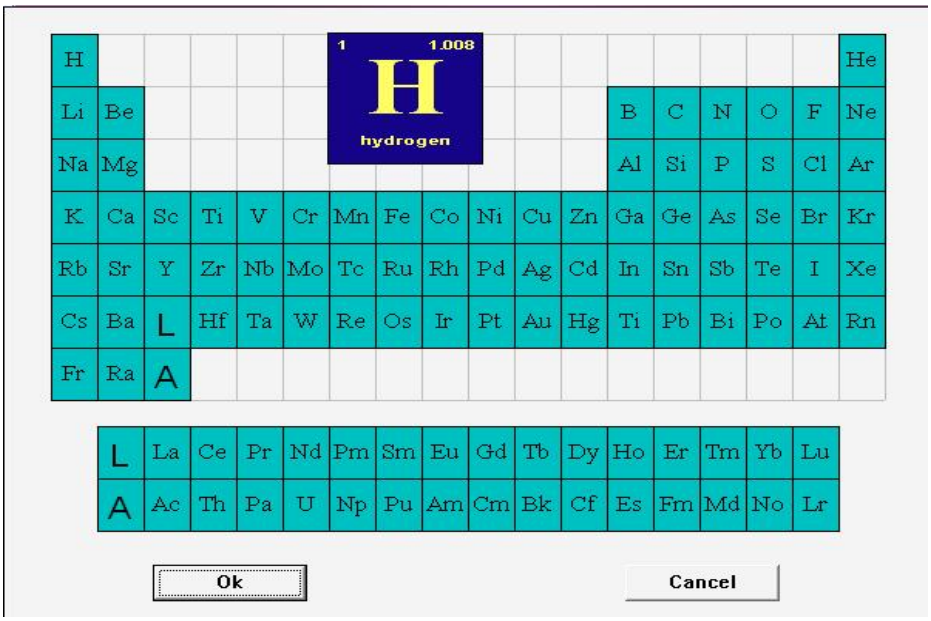


Figure 4-12

2. Select an element and click, then the element is checked and displayed in prominent position, as shown in Figure 4-13.

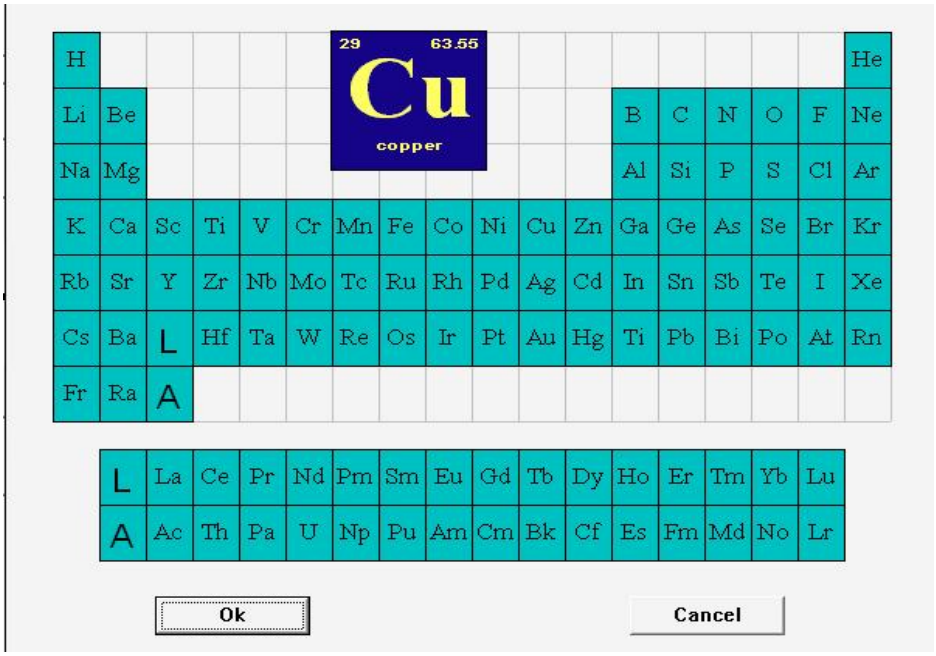


Figure 4-13

3. Click on 【OK】 button to closure "Element Table" dialog box, , Cu element is checked. If you click on Cancel button, then close the dialog box, this element is not checked.

4. The other method is select one element on the “Element Selection” drop-down box and click on it (Figure 4-14), the element is checked

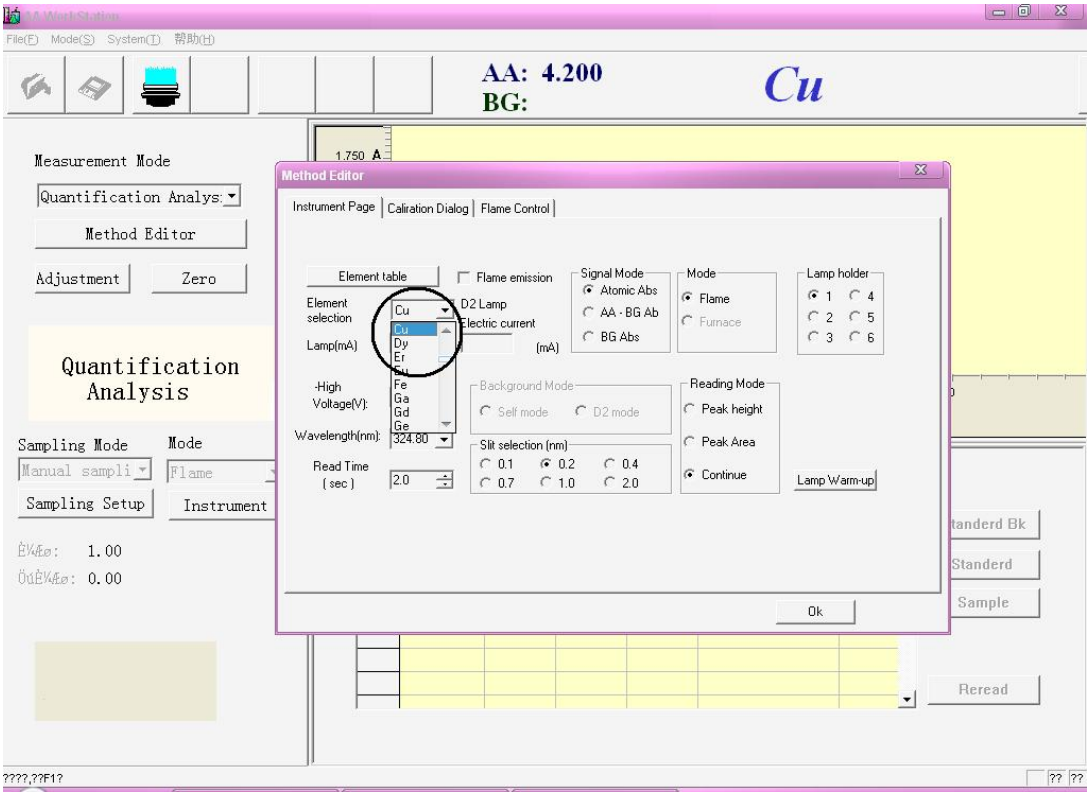


Figure 4-14

NOTICE Atomic absorption method does not apply to non-metallic element analysis, when the element chosen has no corresponding analytical condition it can not be analyzed.

5. Wavelength choosing. The default wavelength is main sensitive line of selected element,if u want to select another sensitive line move the cursor to "wavelength" drop-down box,check one and click on a wavelength value, the wavelength is selected, as shown in Figure 4-15.

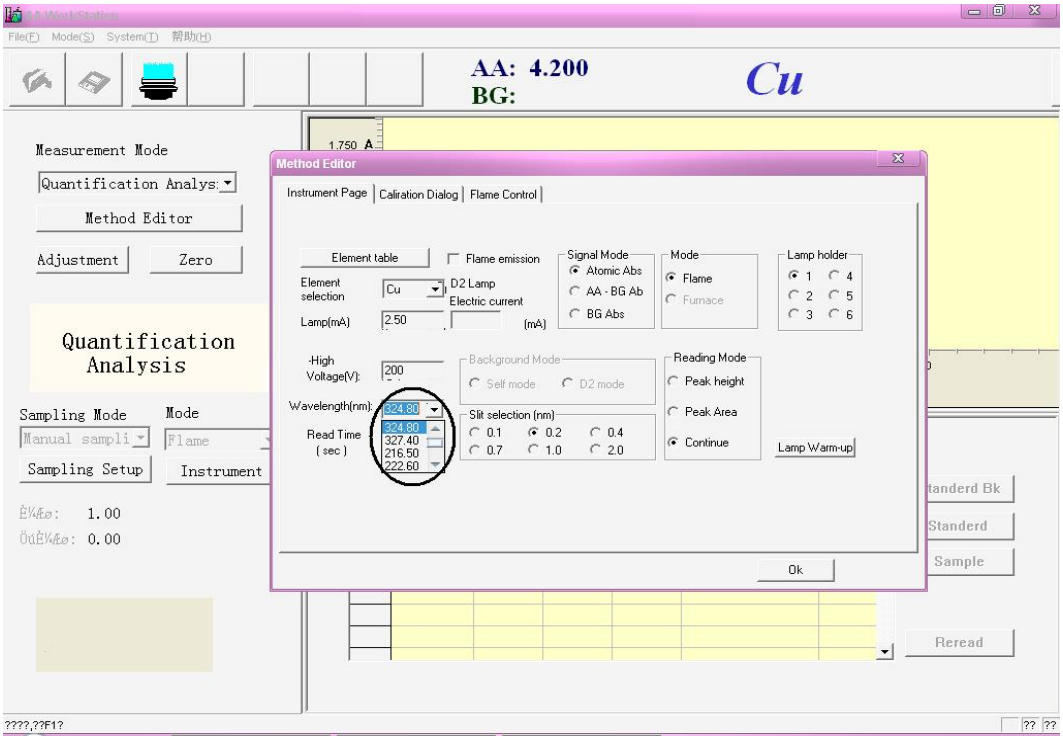


Figure 4-15

6. Negative high voltage choosing. Input the negative pressure value in the “-high voltage “text box. The

value is between 0 and 800V (Figure 4-16).

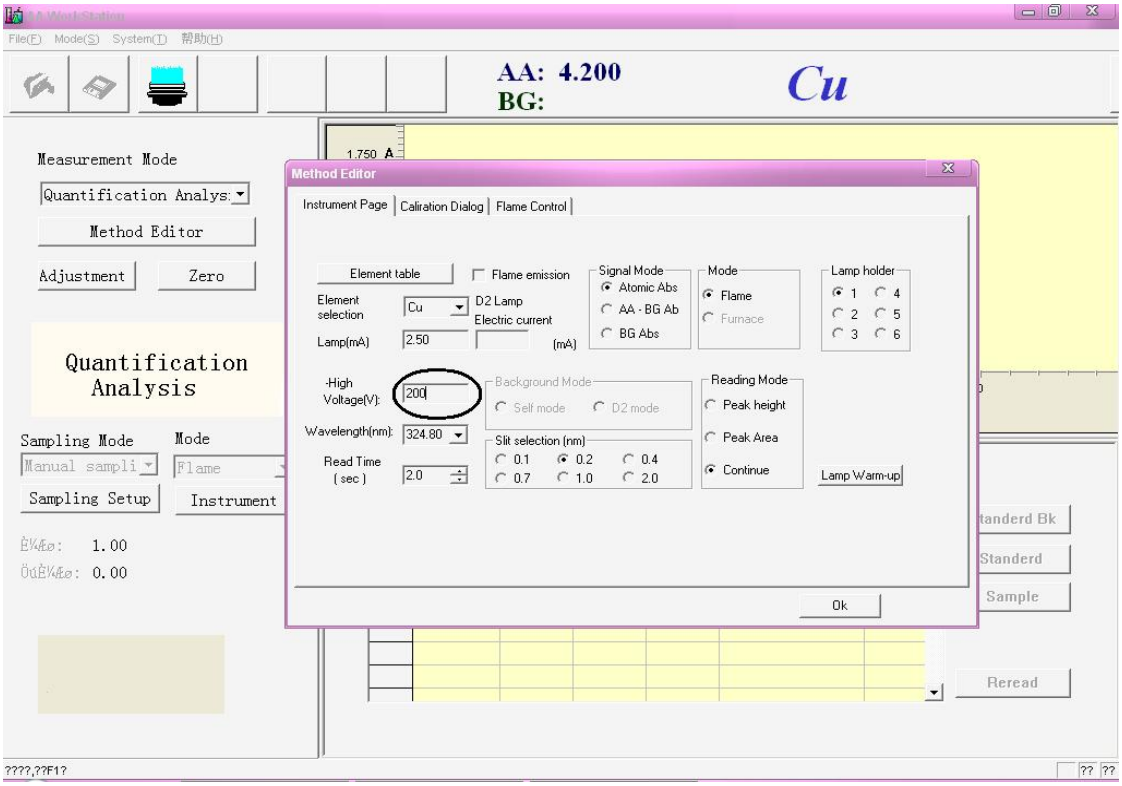


Figure 4-16

7. Lamp current choosing. input current value in the “lamp(mA)” text box. The value is between 0 and 12mA. (Figure 4-17).

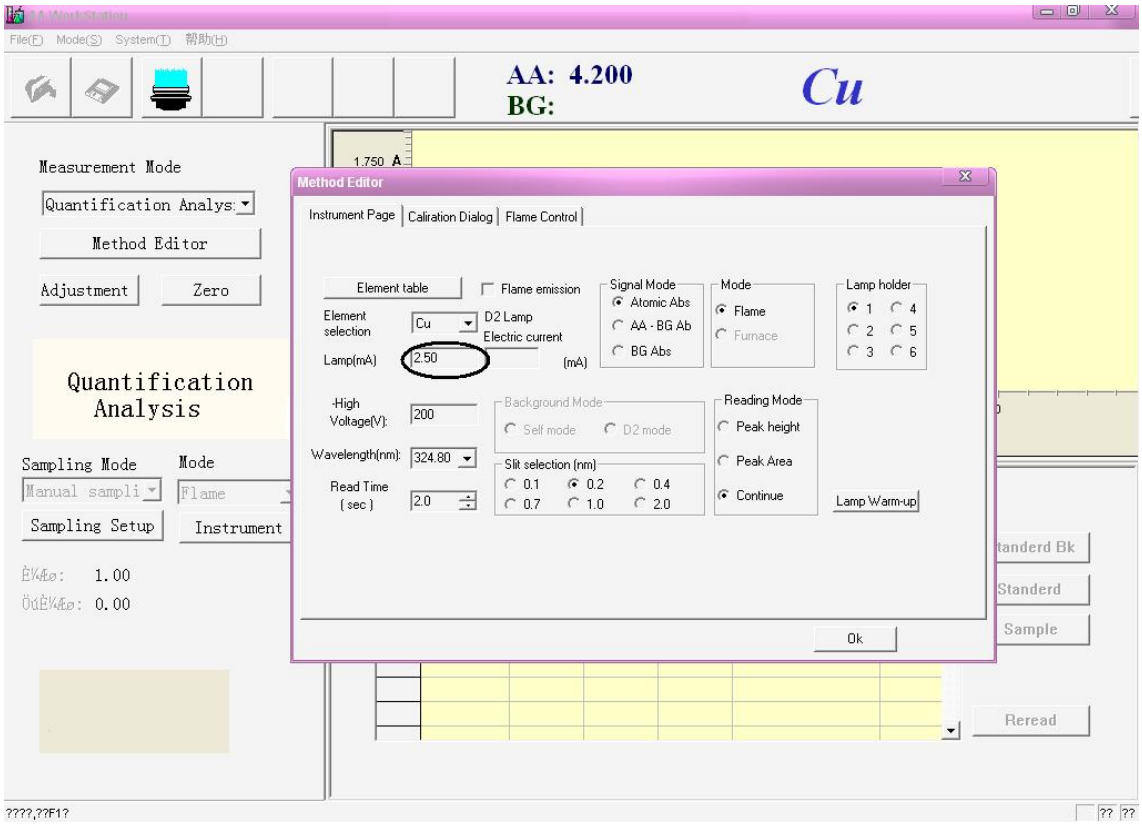


Figure 4-17

8. Signal Mode. There are three signal modes(atomic absorption, background absorption, background correction). Choose random one in the radio box, (dot inside the radio box shows it is selected), as shown

in Figure 4-18.

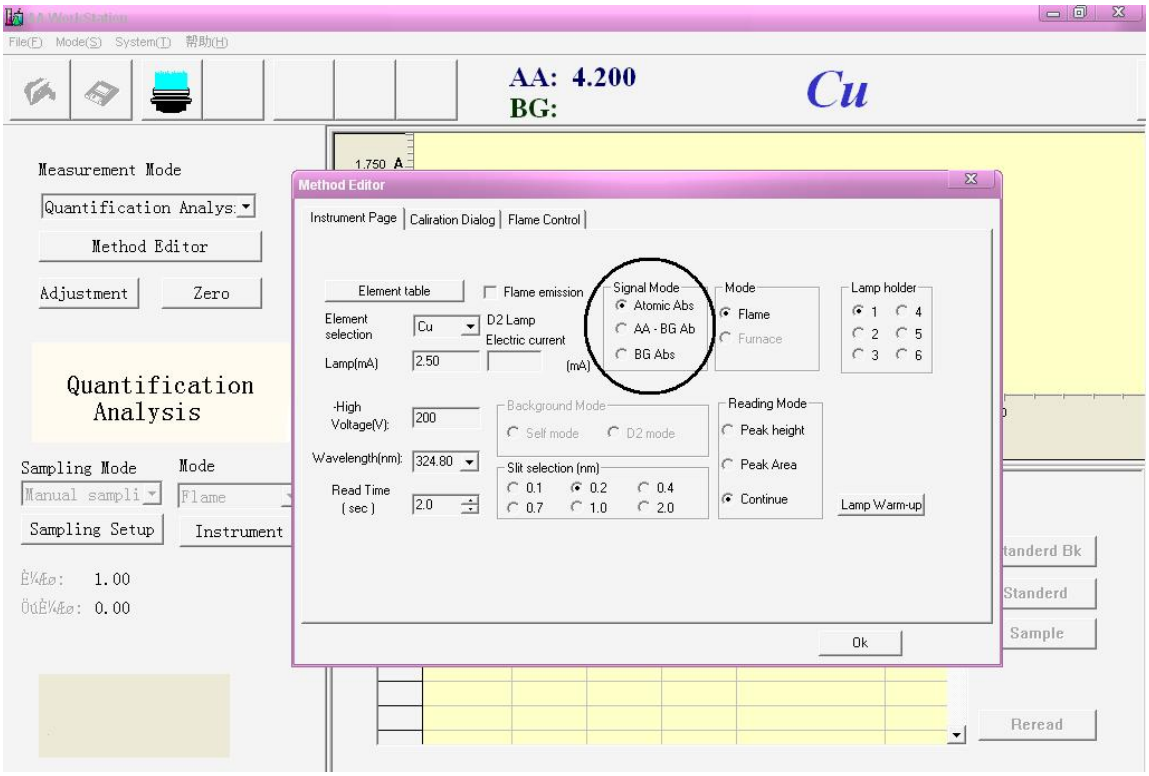


Figure 4-18

9. Each signal corresponds to different situation:

a. Select the "Atomic Abs" (Figure 4-19), “D2 lamp electric current” is gray, background mode is also gray,”Flame Emission” is valid (check it or not).

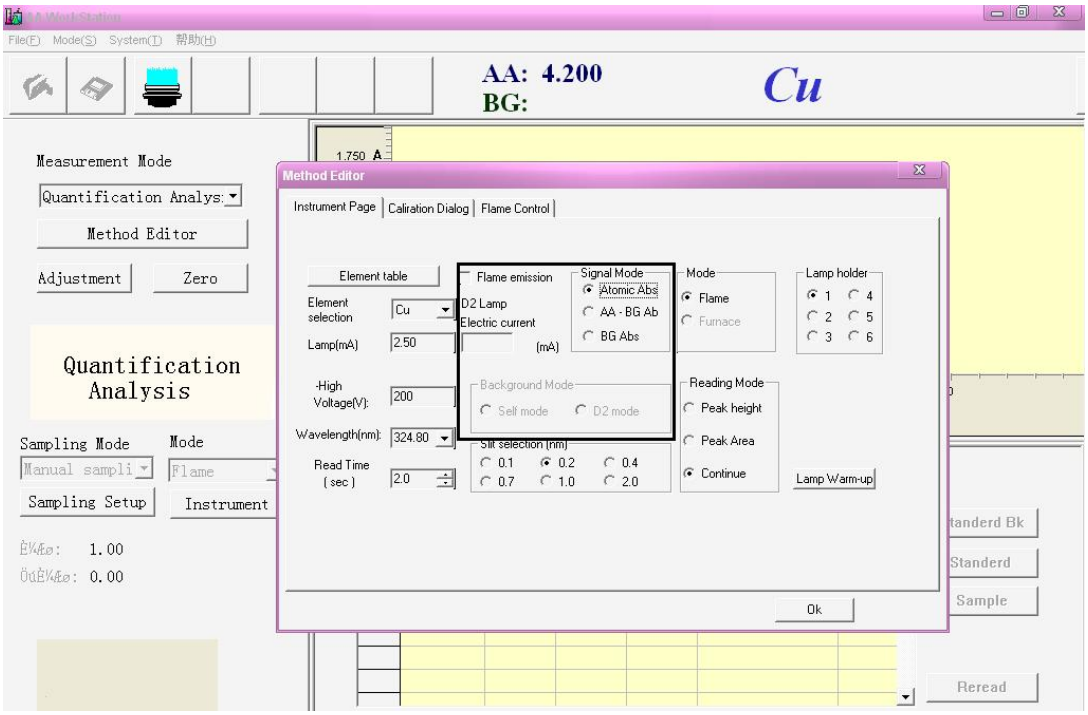


Figure 4-19

b.Select the "AA-BG AE" (as shown in Figure 4-20), “Background Mode” ,“Self mode” or “D2 mode” is valid, the”Flame emission” is gray

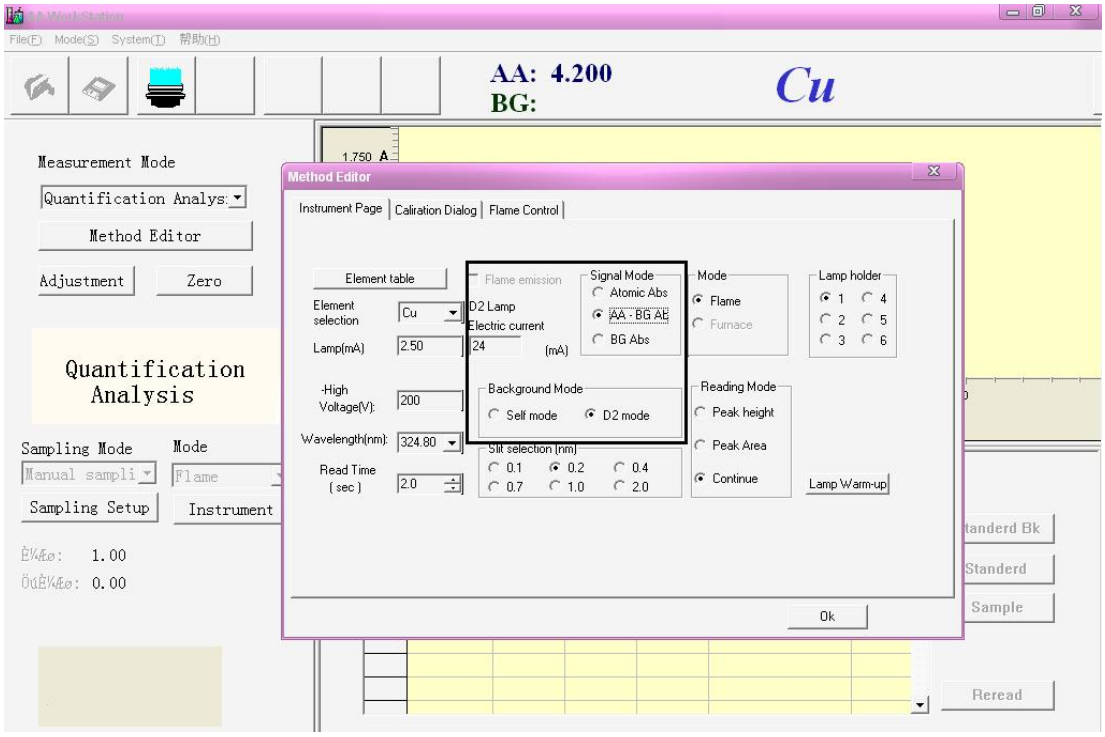


Figure 4-20

c.Select the “BG Abs”, the”Flame emission” and “D2 mode” are valid, “Self mode” is gray(as shown in Figure 4-21)

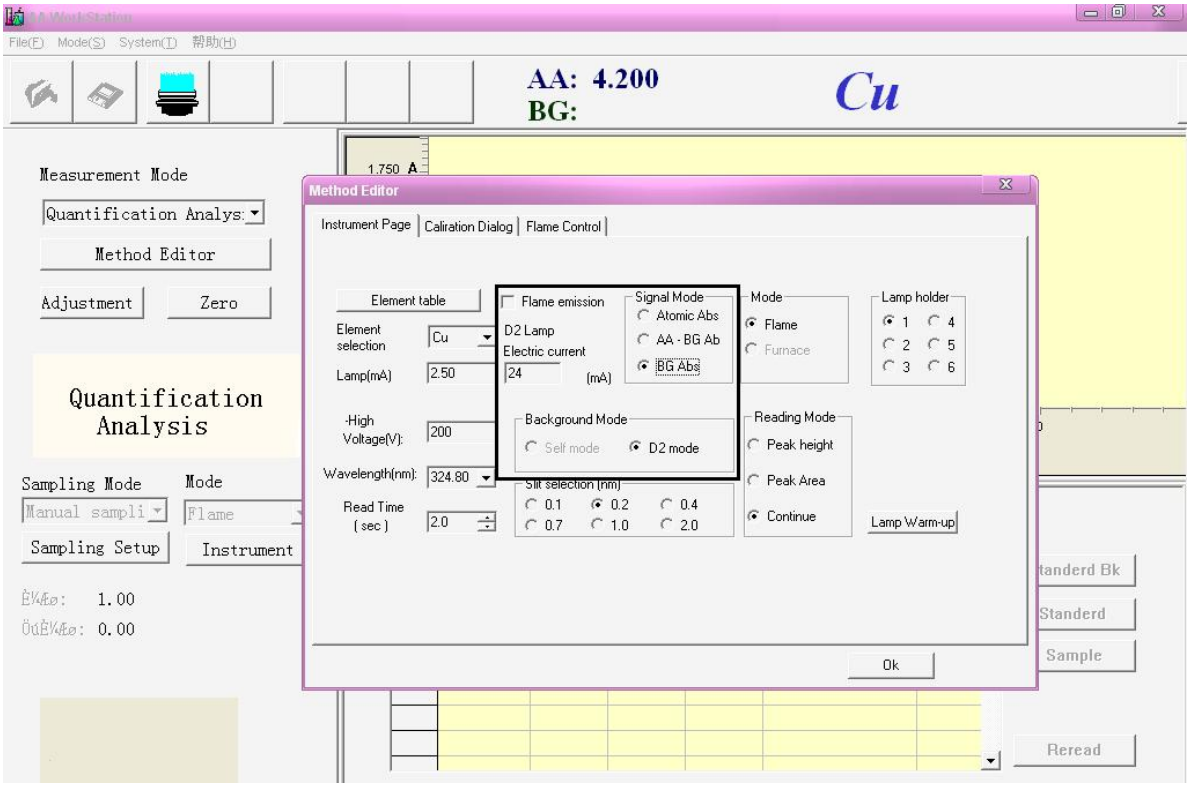


Figure 4-21

10．Setting D2 lamp electric current,there are the following cases:

a.Select the "Atomic Abs“ on “Signal Mode”, “D2 lamp electric current” input box is gray

b.Select the "AA-BG AE" on “Signal Mode”,there are two cases are possible:

1)Select the”D2 mode” on “Background Mode”,input the current value into the text box.The value is between 24-93mA(Figure 4-22)

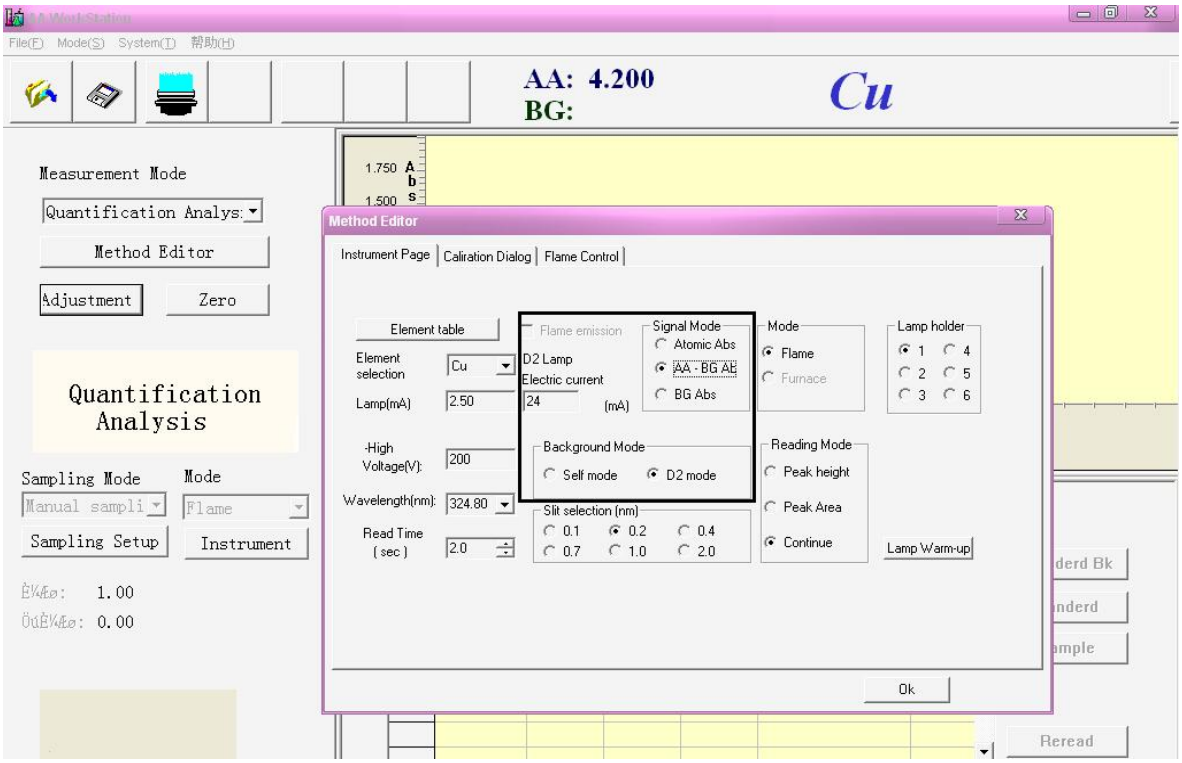


Figure 4-22

2)Select the “Self mode” on “Background Mode”,the text box of “D2 lamp electric current” change into “Self electric current”, input the current value into the text box(Figure 4-23).The value is between 0-14mA

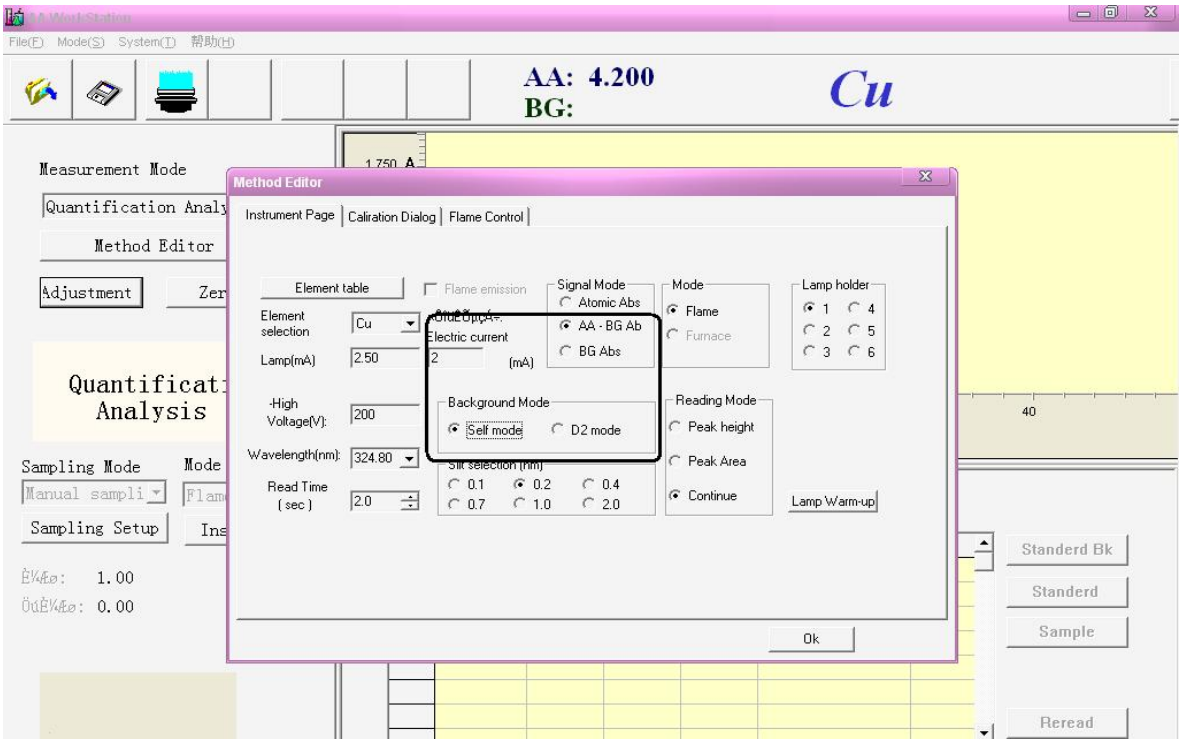


Figure 4-23

c.Select the “BG Abs” on “Signal Mode”, the text box of “D2 lamp electric current”is valid,input the

current value(Figure 4-24)

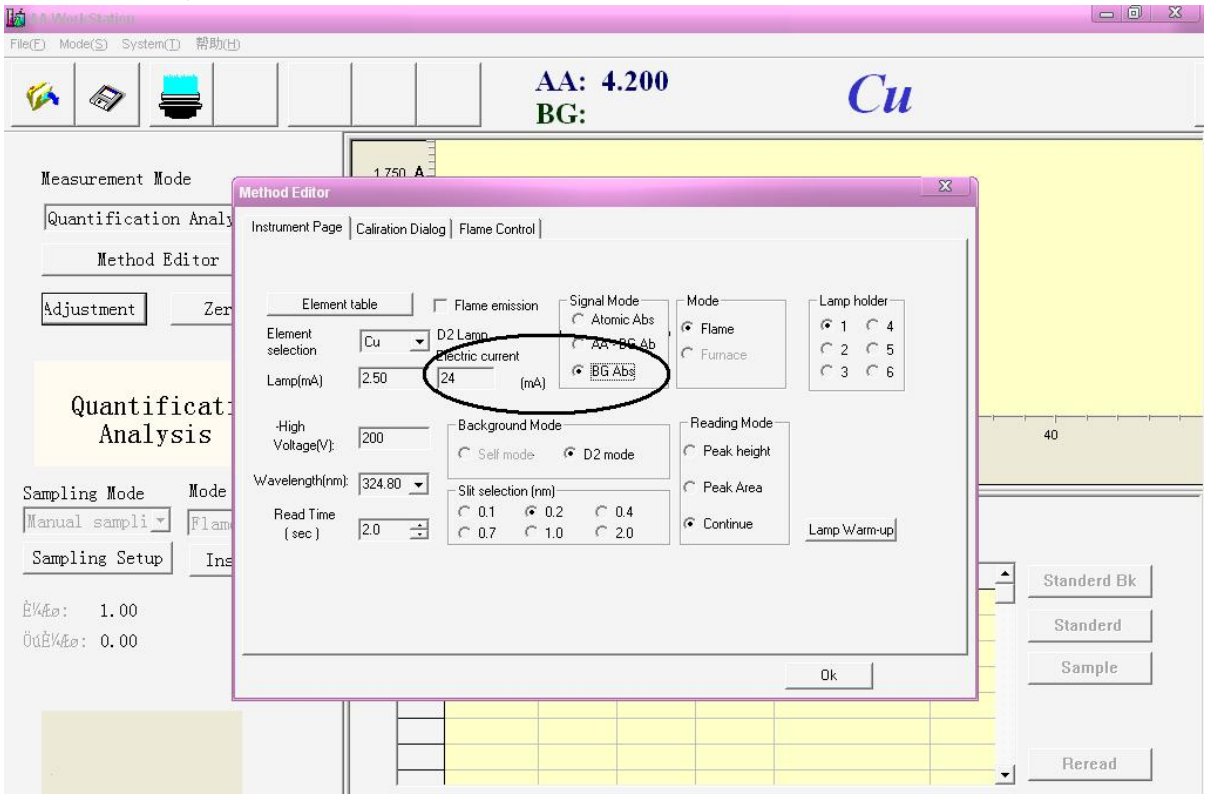


Figure 4-24

d."Slit Selection(nm)",only can select one among 0.1,0.2,0.4,0.7,1.0,2.0(Figure 4-25)

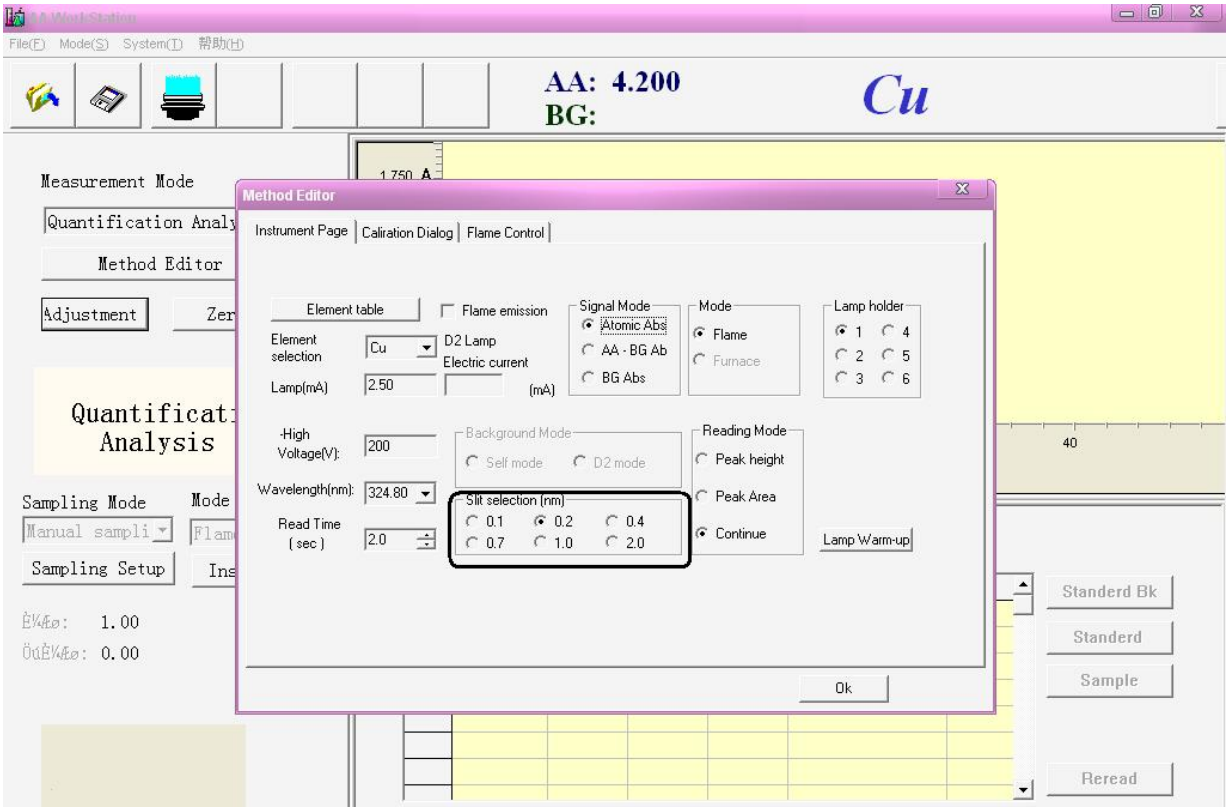


Figure 4-25

1.”Lamp Holder”.only can select one among1,2,3,4,5,6(Figure 4-26)

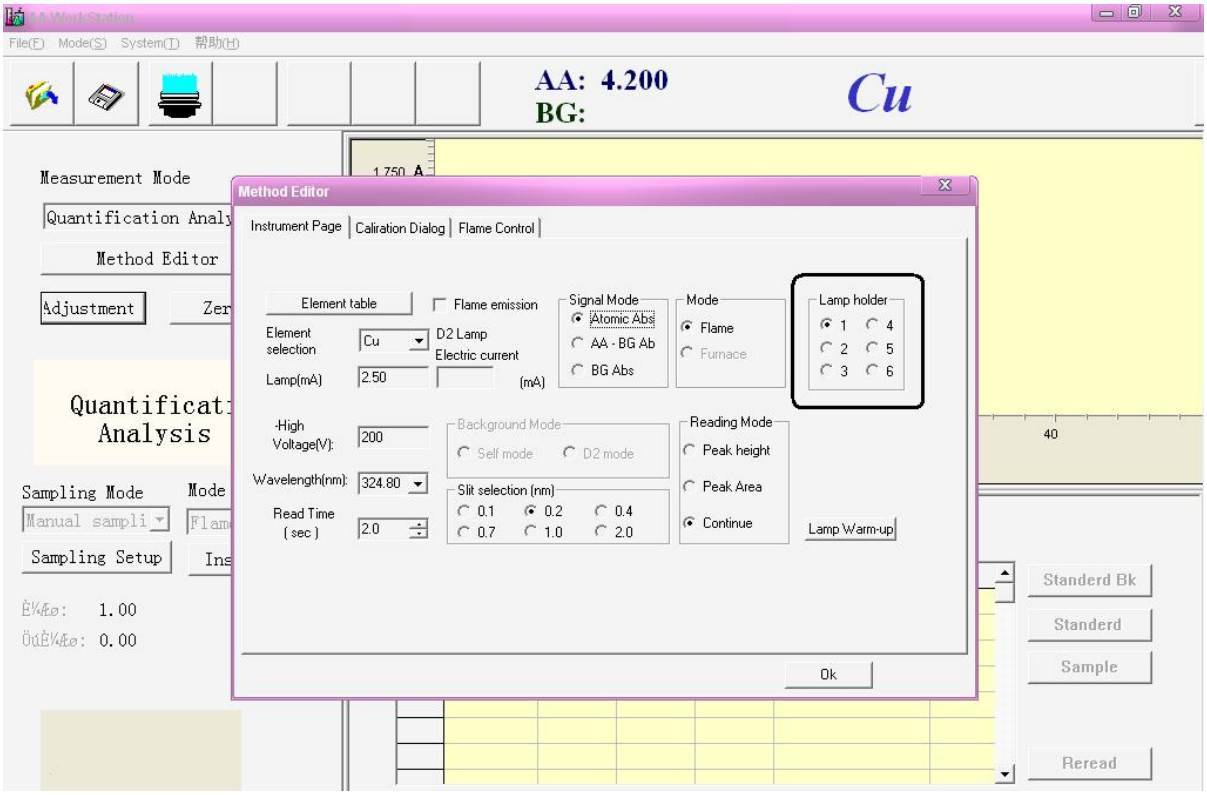


Figure 4-26

When flame is equipped,you can select the ”Flame”.when graphite furnace is equipped,you can select the “Furnace” (Figure 4-28)

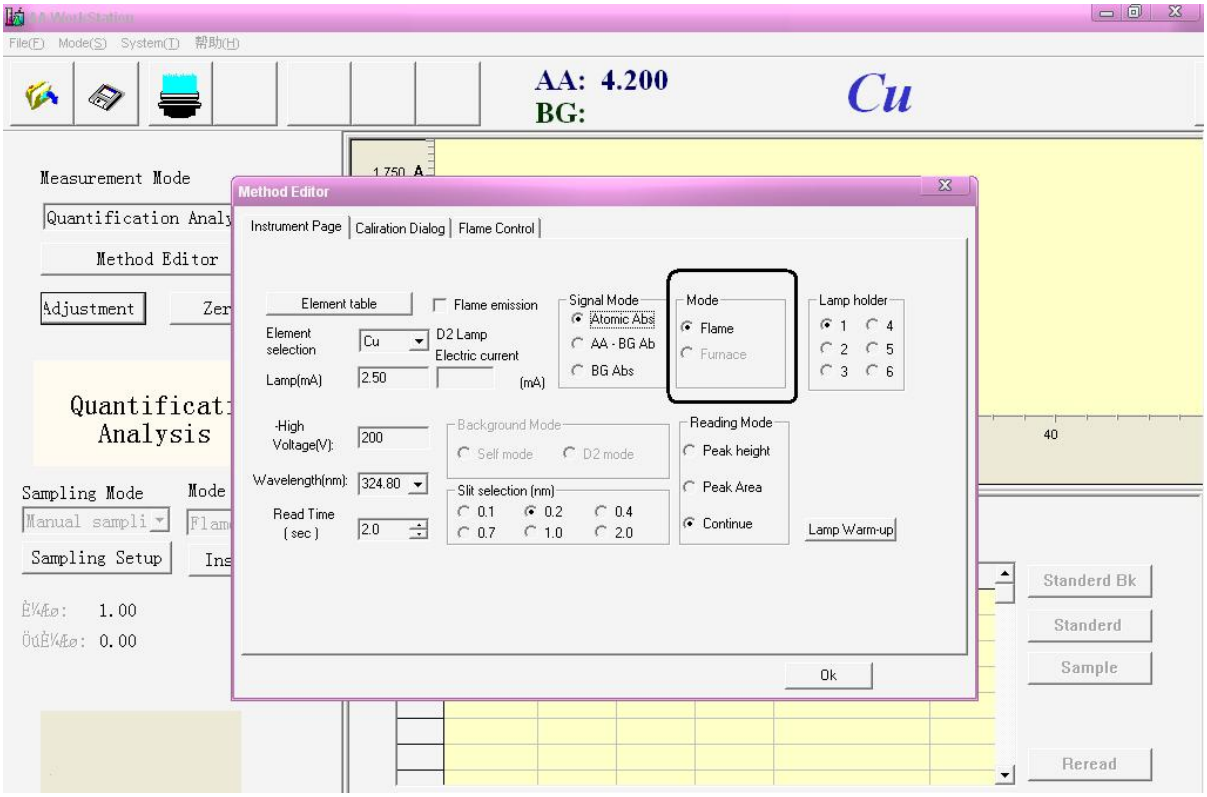


Figure 4-28

16.”Reading Mode”.according to different test you can select one among the three modes—“peak height”,”peak area”,”continue” (Figure 4-30)

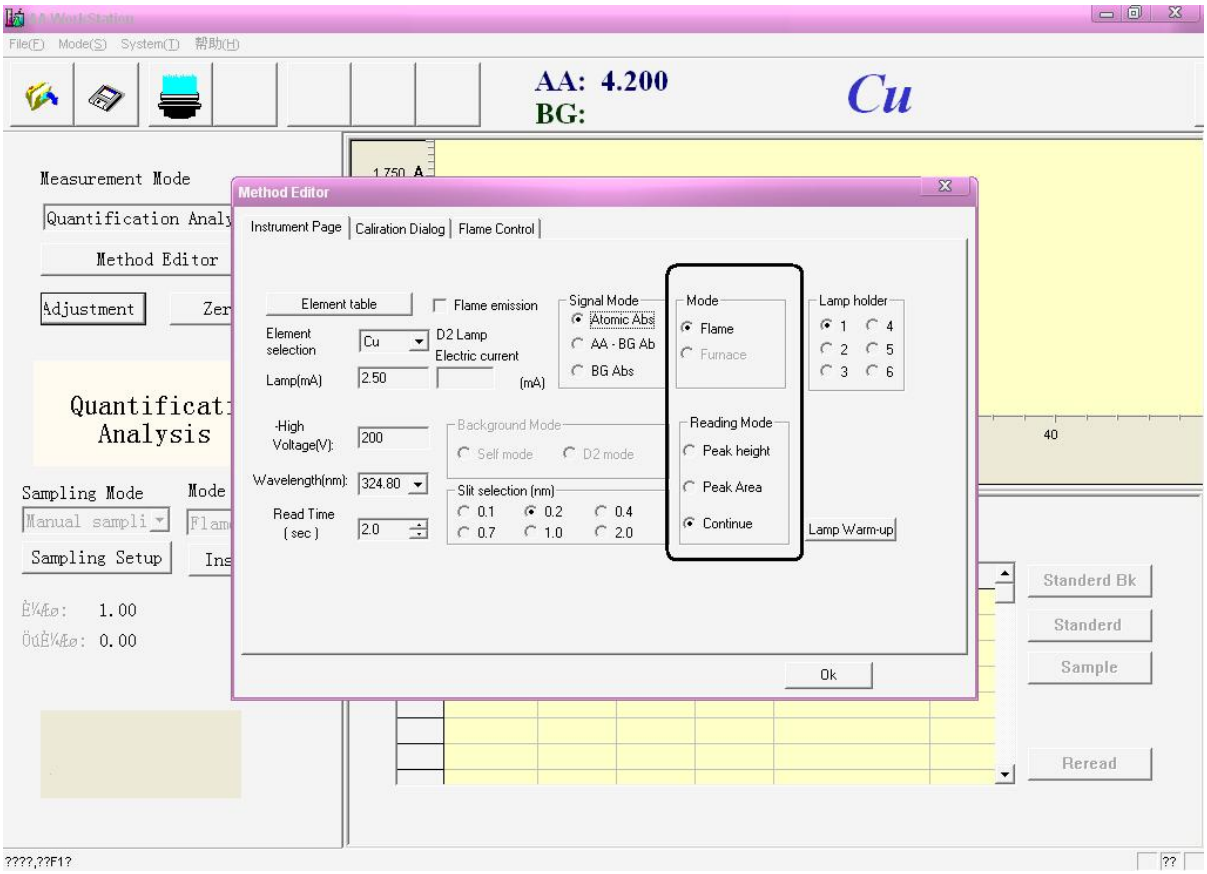


Figure 4-30

NOTICE Usually select “continue” when you use the flame method

q.Press the “lamp warm-up”,display the figure 4-31 dialoge box,you can select more than one lamp to warm up.

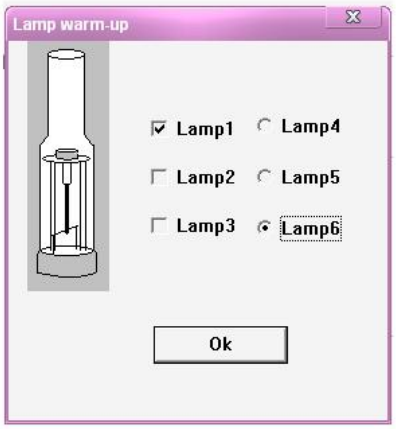


Figure 4-31

Calibration Dialoge Window

1.”Equation”.you can select one among the seven methods—“linear”,” calibration curve”, “linear standard addition method”, “curve standard addition method”,” the absorbance direct reading”, “single-point method”, “the standard deviation” (Figure 4-36)

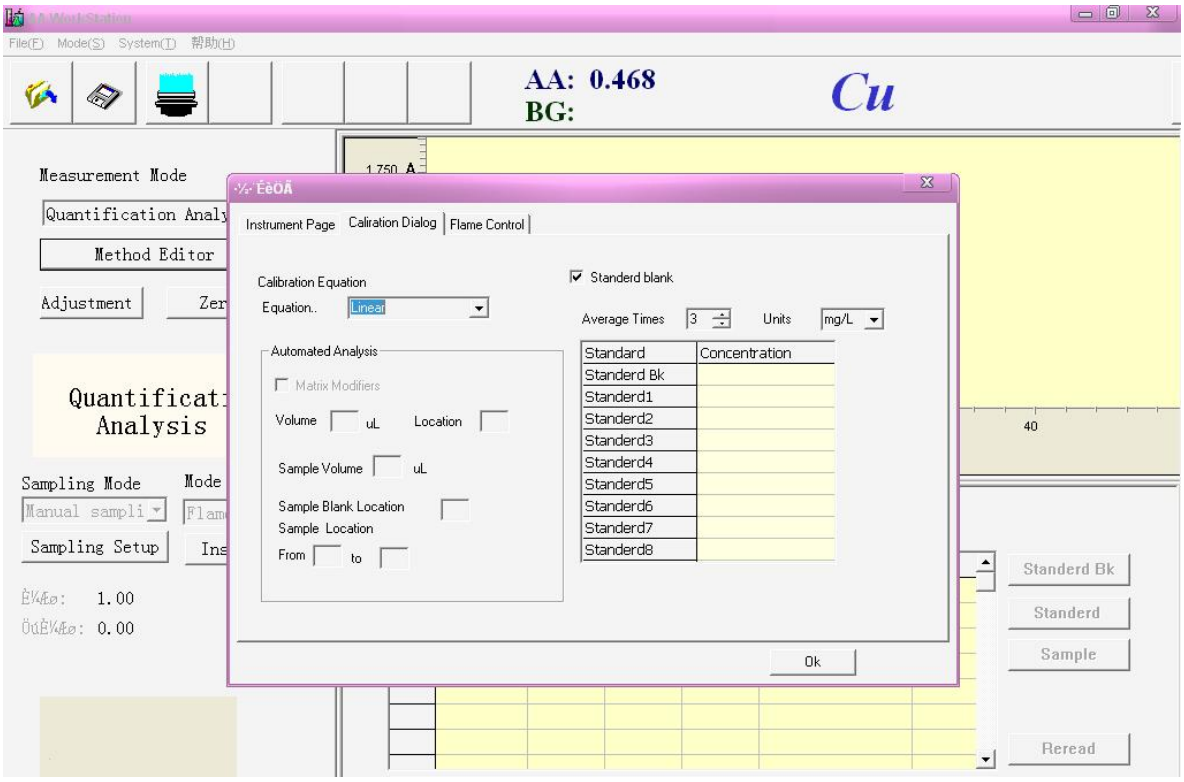


Figure 4-36

2.”Average times”.input a appropriate value between 1 and 21.Two methods,one is inputting the value directly in the input box,the other is press the arrow on the right of the input box(Figure 4-37)

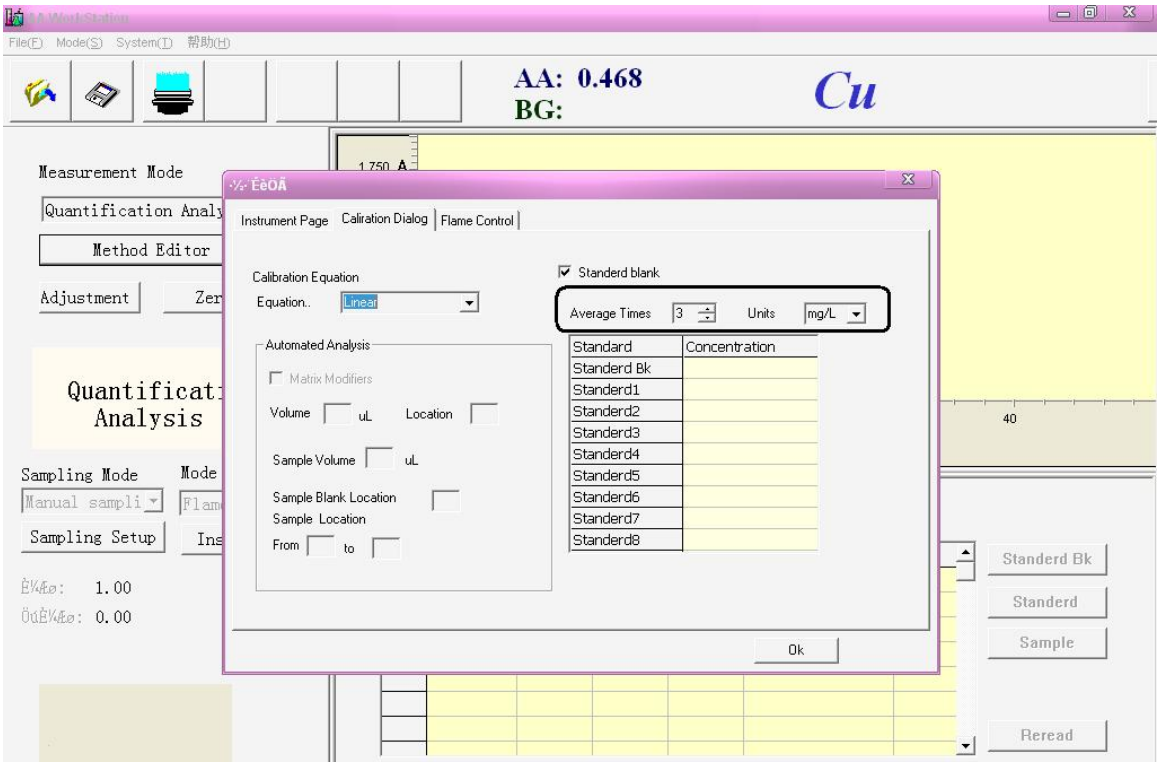


Figure 4-37

Flame Control Window

The window is shown in figure 4-40

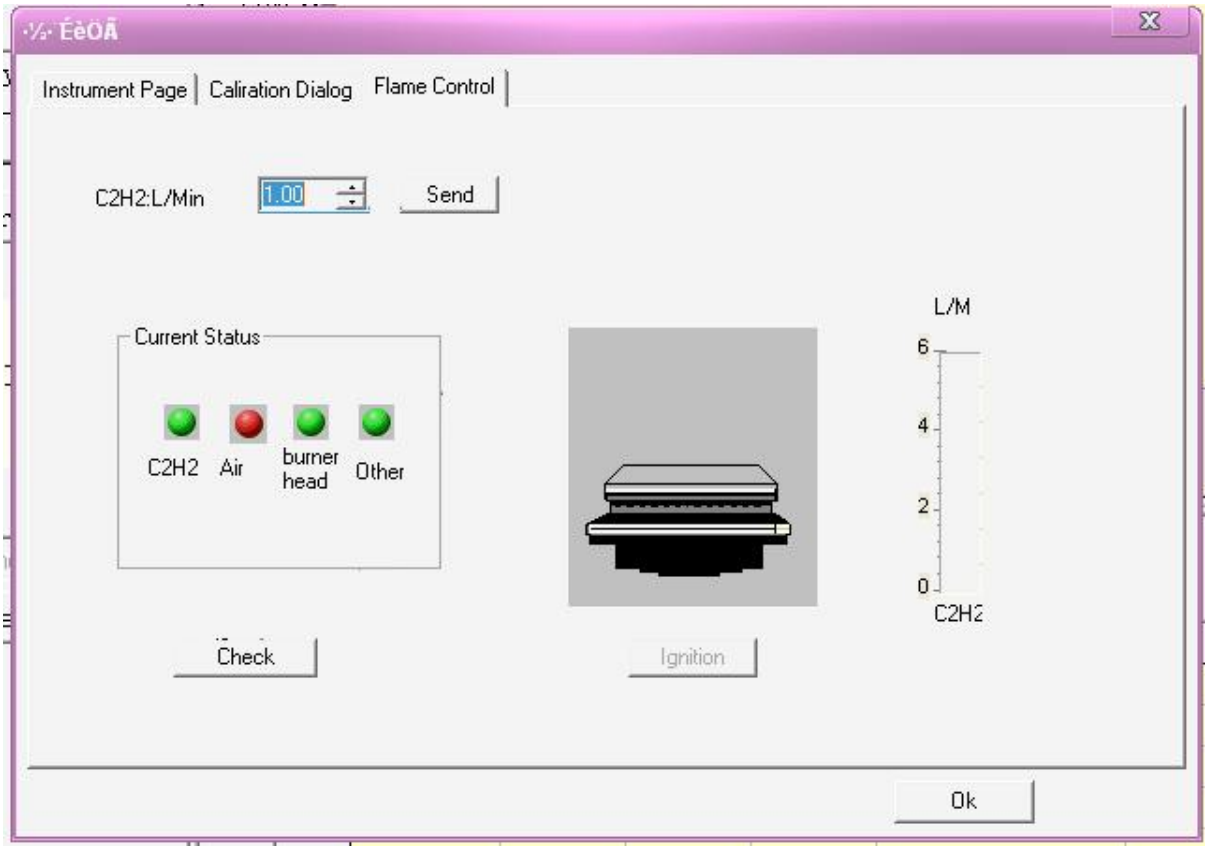


Figure 4-40

Align lamps window

Take a copper lamp 1 as a example

1.Press"Adjustment" button,pop up a dialoge box(Figure 4-43)

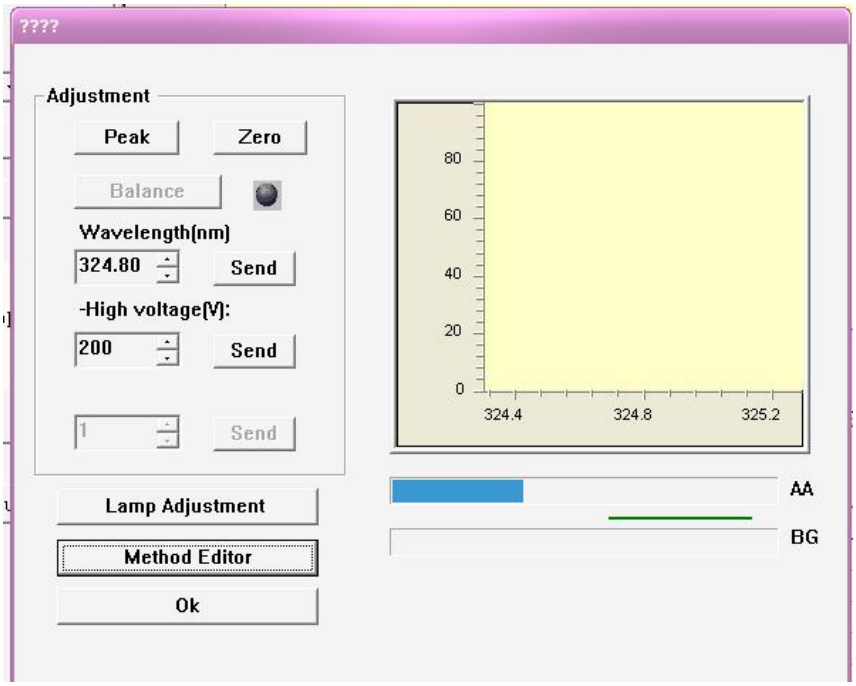


Figure 4-43

2.Press"Method Editor"button into the "Instrument Page"window.

Eg.select"Cu"element, wavelength:324.8nm,-high voltage:200V, current :2.0mA, slit:0.2nm Figure 4-43a

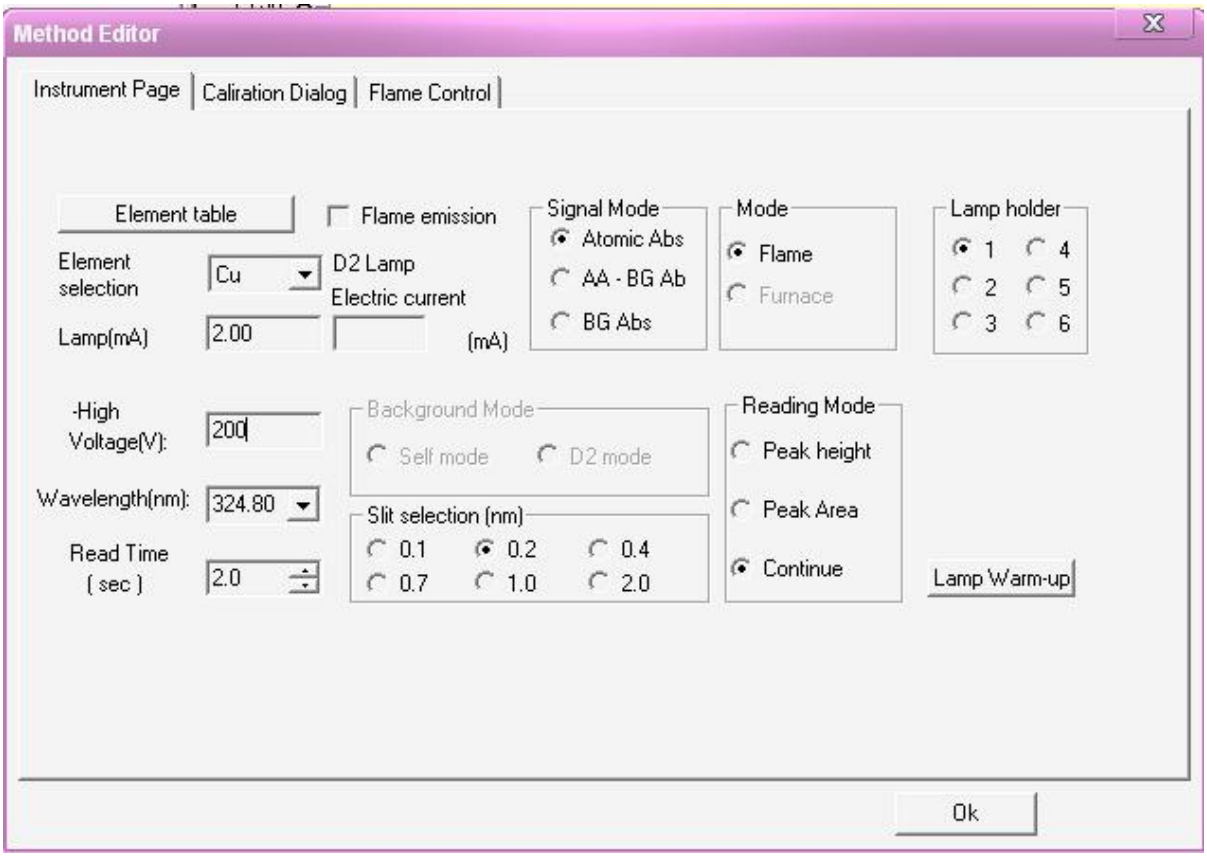


Figure 4-43a

c.Press【ok】shows Figure 4-44,press"Peak"button, it will automatically find the center opposition of wavelength

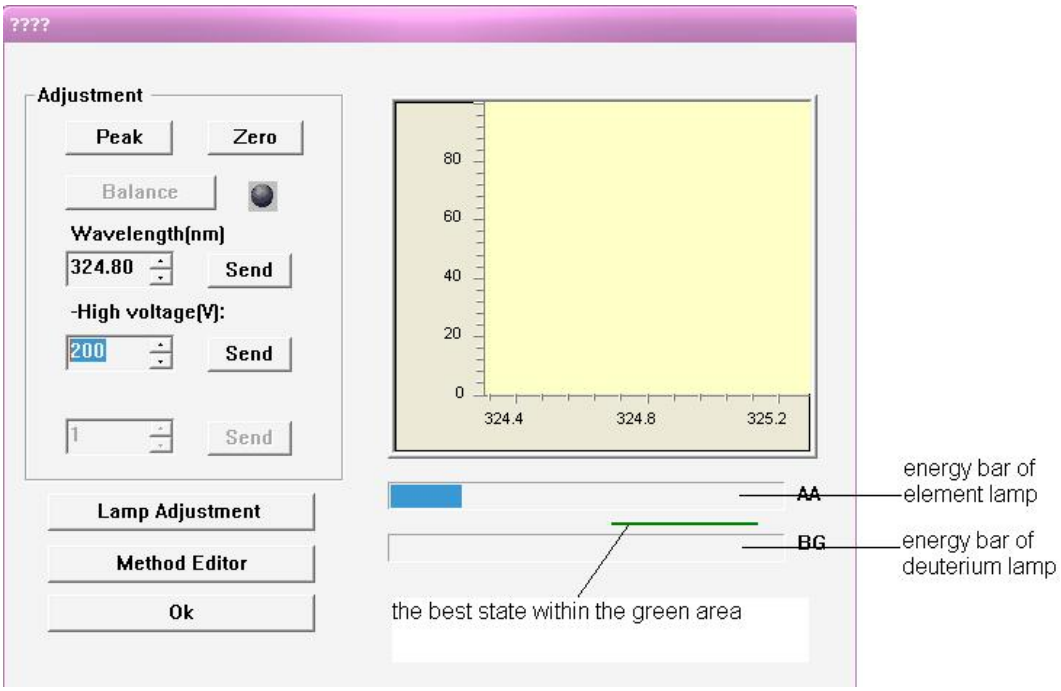


Figure 4-44

If the energy close to zero increase lamp current and the negative high pressure, or adjust the lamp position through “lamp adjustment”

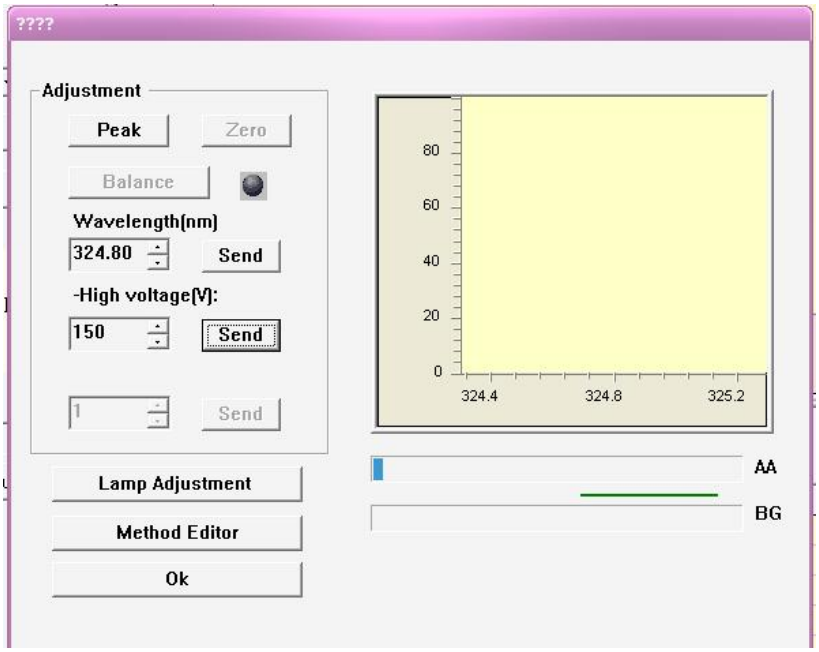


Figure 4-44-1

If the energy bar is not in the green area,press”zero”or increase the negative high pressure to let the energy bar in the green area.

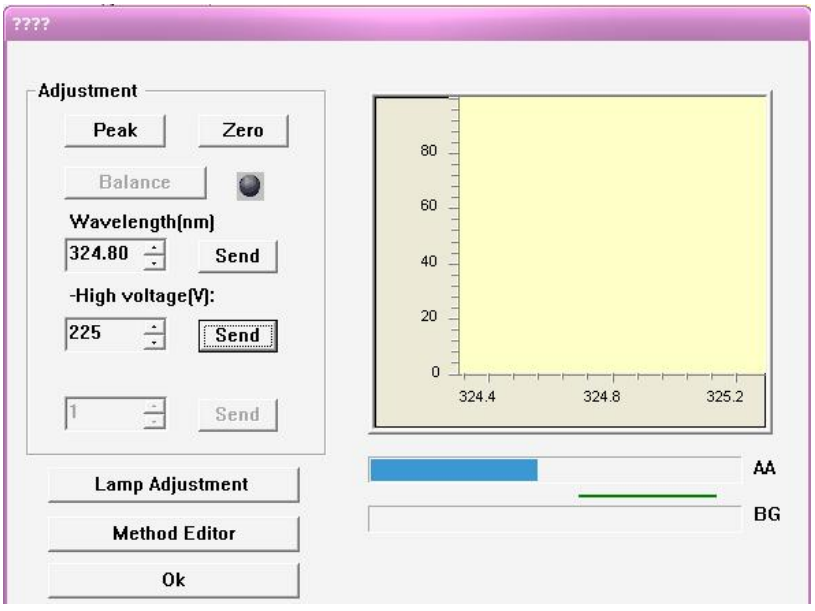


Figure 4-44-2

If the energy bar go beyond the area,decrease negative high pressure and peaking again until the bar is in the area,it is the best absorption peak for the element

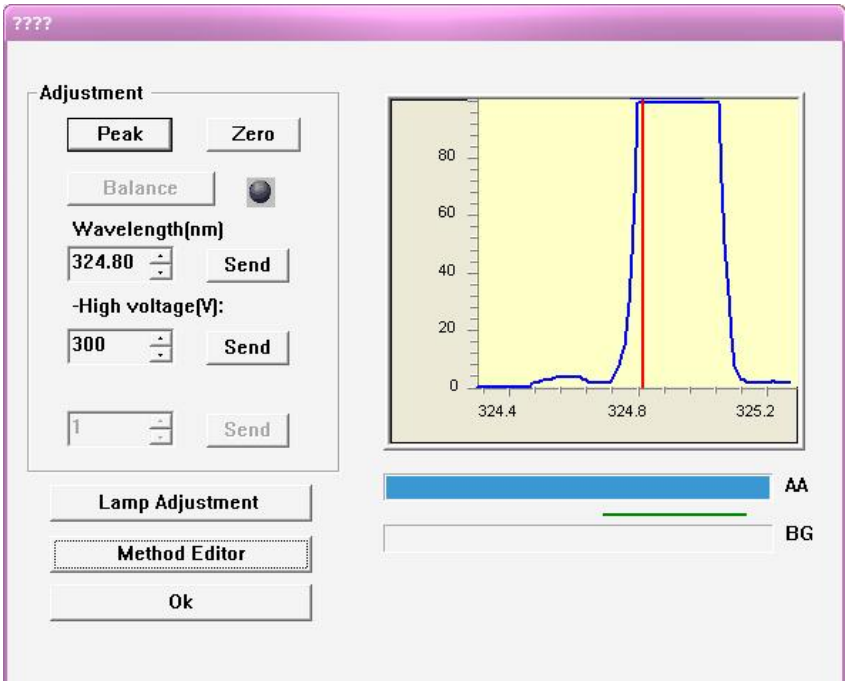


Figure 4-44-3

As shown in figure, energy at its best

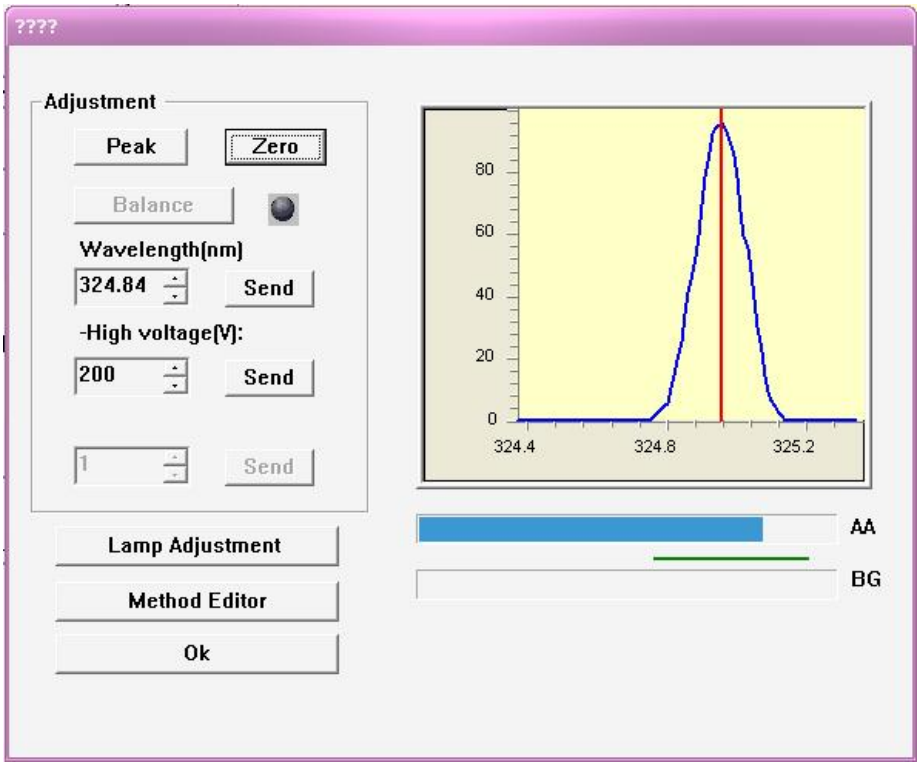


Figure 4-44-4

Igniting the flame

WARNING Please check if you have added water to the drain trap before igniting the flame everytime

Connect the gas system follow the figure 4-48

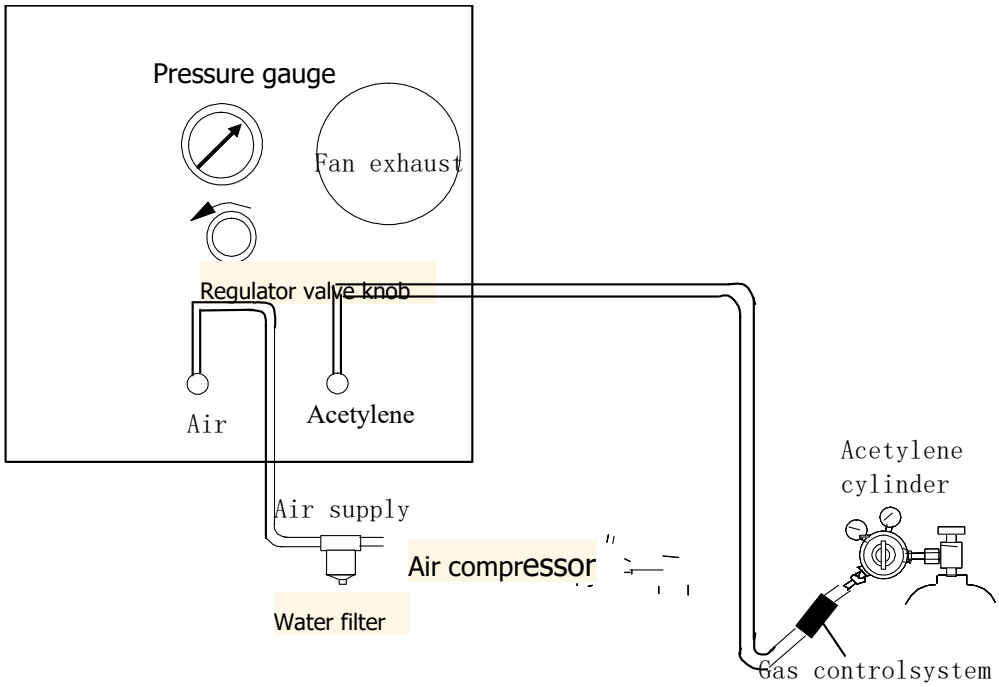
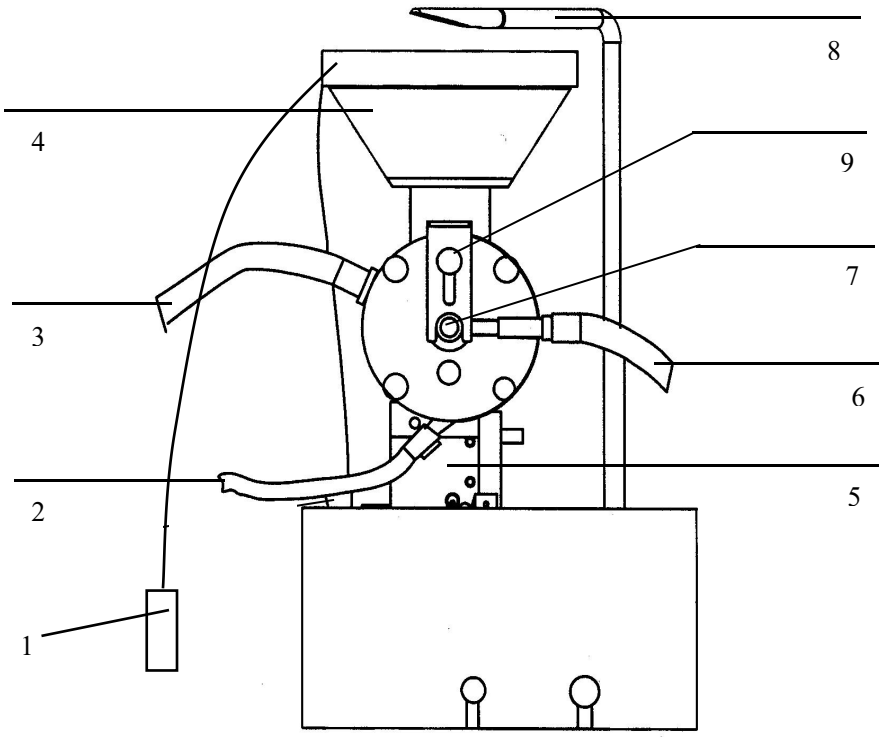


Figure 4-48

Checking the gas system

You must check the gas system before igniting the flame to insure no gas leak and check it regularly later.Figure4-49



1. Safety interlock and identification head for testing 2. Drain Tube 3. Mixed trachea
4. Combustion head (50mm or 100mm) 5. Automatic lifting platform 6. Atomization tube
7. Atomizer 8. Igniter 9. tablet

Figure 4-49

Procedure:

1.First connect the tubes, open the acetylene reducing valve,adjust the output pressure to 0.1MPa, close the valve.

2. Unscrew the two trachea joints in the combustion chamber from the pre-mixed (as shown 3 and 6 in Figure 4-49),connect them together with the connector, tighten and seal.

3. Open air compressor, adjust the output pressure to 0.3MPa, adjust the internal pressure of the pressure regulator valve to 0.2MPa, open the power supply and the acetylene needle valve, press 【leak】 button, and then shut down the pressure regulator valve,within 15 minutes, the internal pressure drops to not more than 0.02Pa, or there is gas leak

WARNING It is dangerous to use the leaking gas system

Igniting (air – acetylene)

a. Open the air compressor, adjust its pressure to 0.3MPa. Open the acetylene cylinder, output pressure is 0.1MPa.

b. In Figure 4-50a, press 【Instrument】 button into the "Flame Control" page. Figure 4-50b

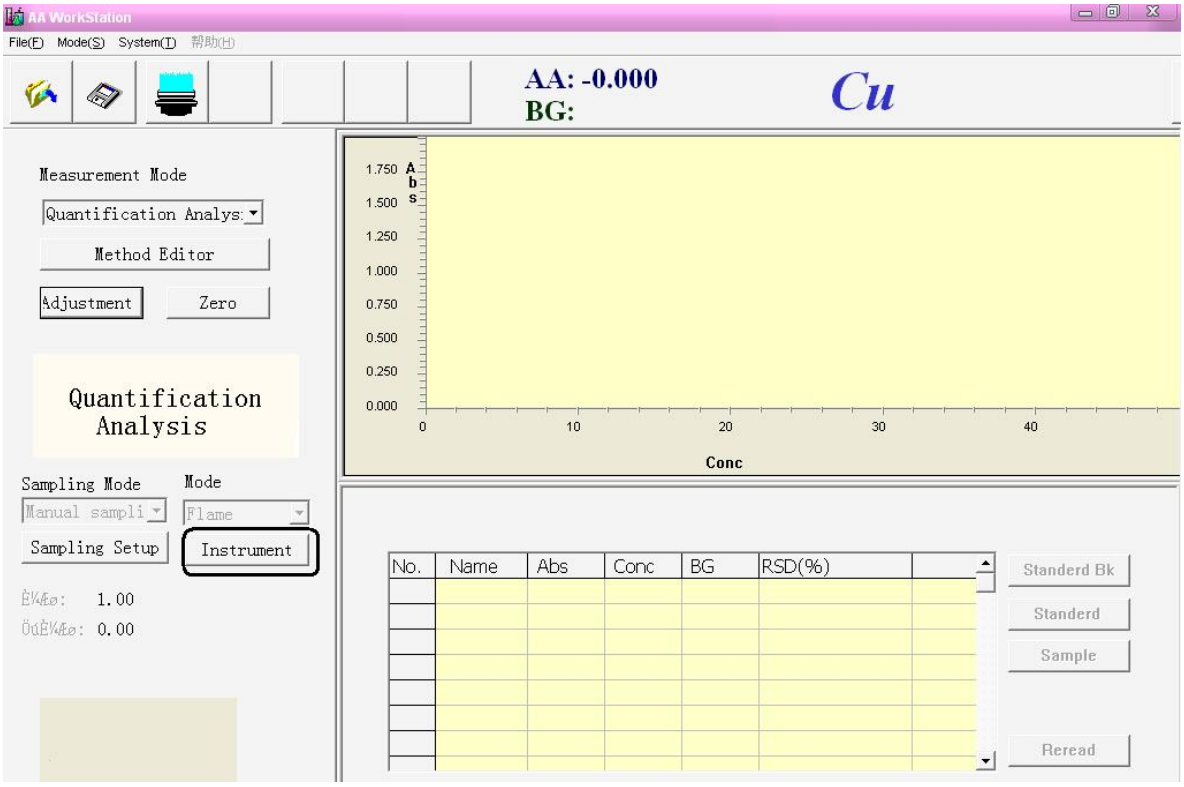


Figure 4-50a

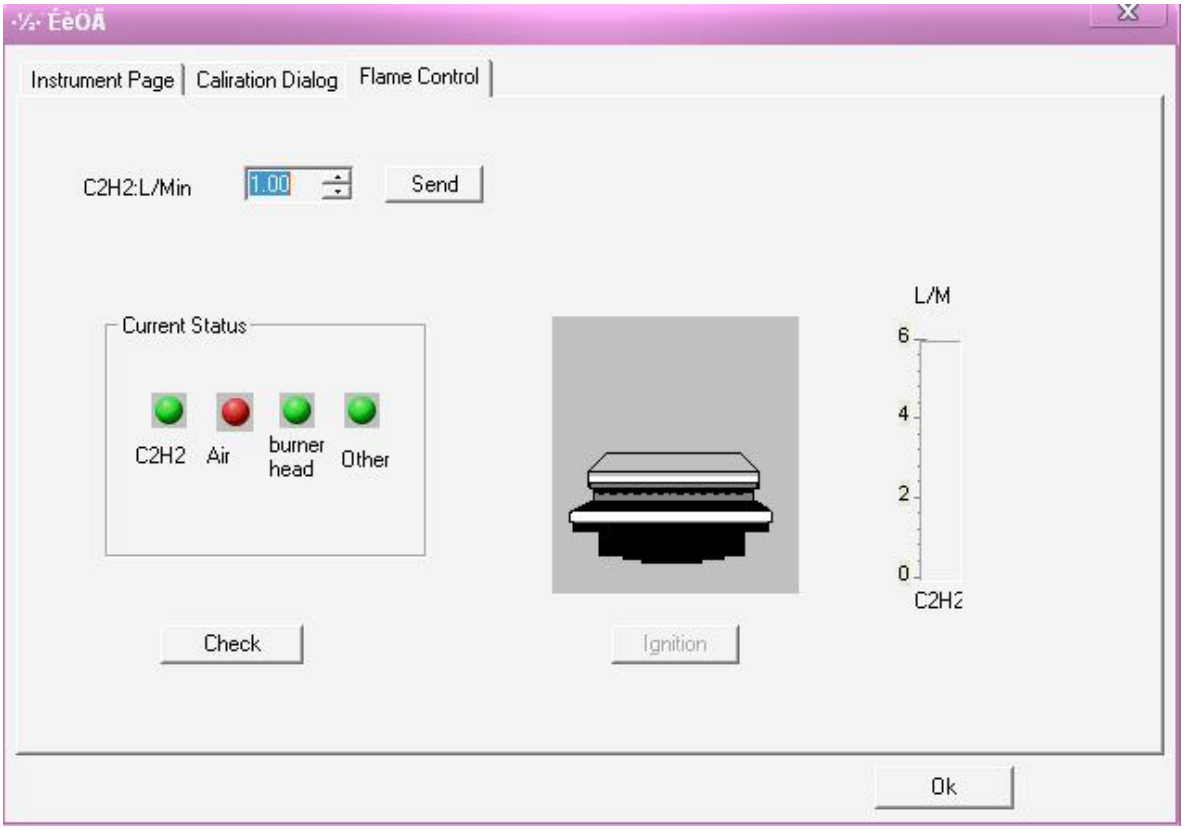


Figure 4-50b

c. Input the appropriate value in the “C2H2”,or move the cursor to the arrow,press it,then

press”Flame”until flame,at the beginning the flame is big(Figure 4-50c)，after several seconds, the flame become normal(Figure 4-50d)

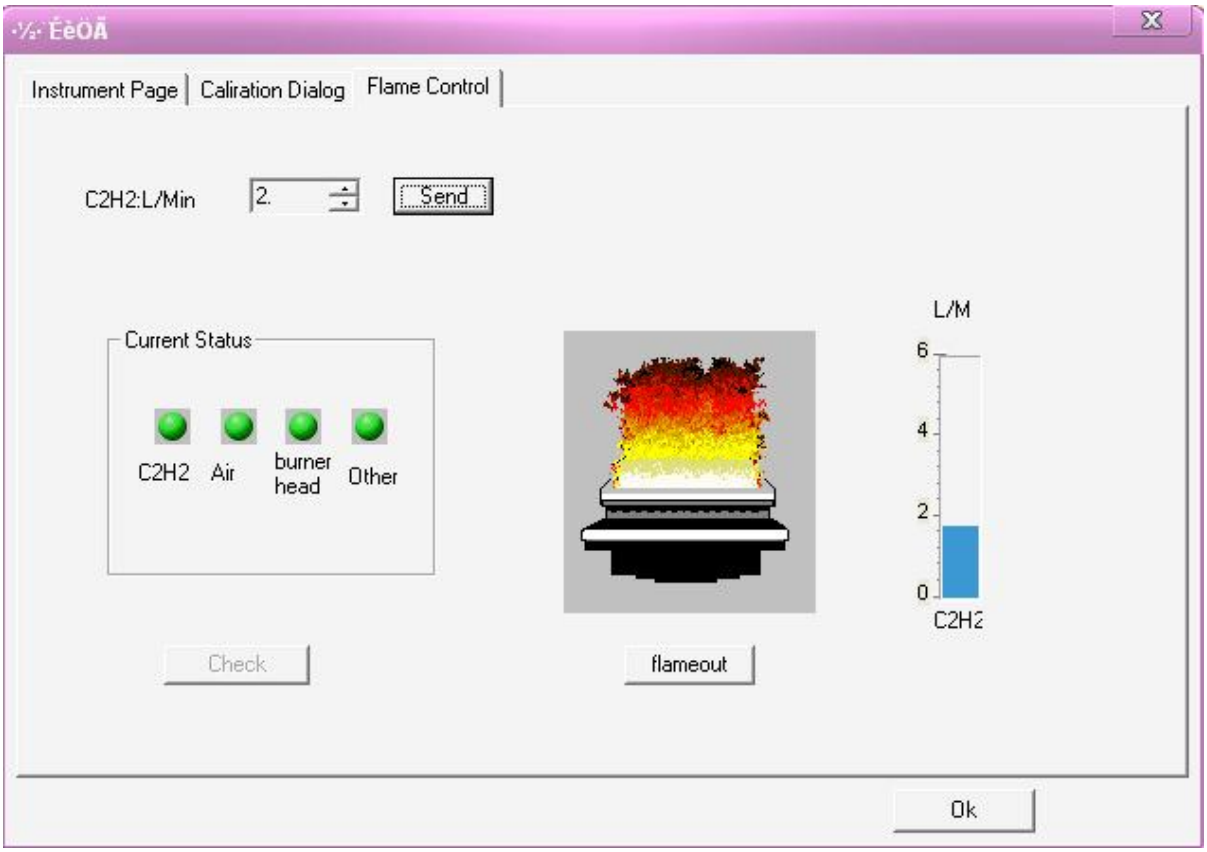


Figure 4-50c

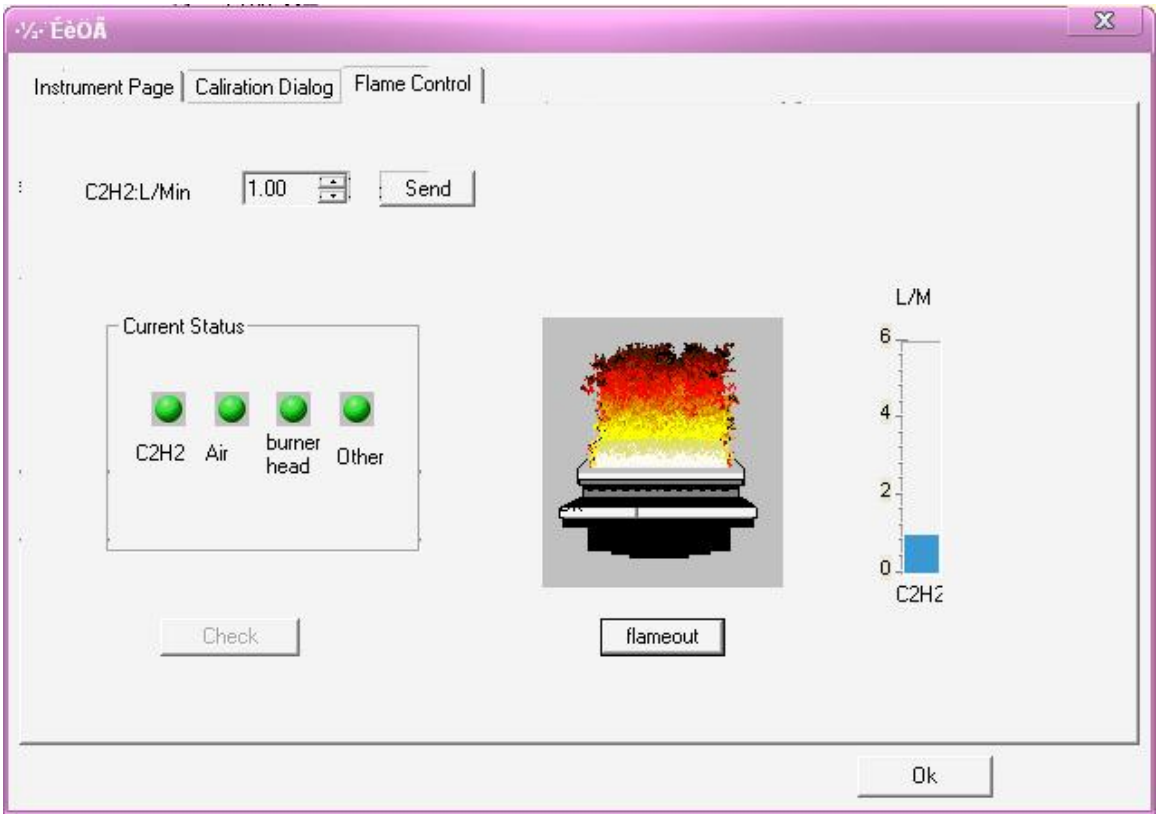


Figure 4-50d

d.After pressing 【Flame】 button if misfiring, increase the acetylene flow

e. The acetylene flow can be changed at any time

f.Press【OK】,close the dialoge window

AA flameout

1. After analysis, first clean it with deionized water, if you use organic solvents, you had to clean the burner.
2. Close the main valve of acetylene cylinder and cylinder regulator then turn off the air compressor
3. If you don't use the instrument for a period of time, turn off the air, acetylene and other gas sources, and press 【check】 button for some time to let gas gone in the tubes

NOTICE If display"Err" during the flame of after the flame,please flame out and contact with us.

Cleaning the burner slot

The burner should provide an even flame over the length of the burner slot.An uneven flame may indicate that the slot needs cleaning.A badly clogged slot may cause a flashback of the flame. Aspirating samples with high solids content may cause deposits to build up along the burner slot.Prolonged operation of the nitrous oxide/acetylene flame may cause deposits of pyrolytic carbon to build up along the burner slot. Extinguish the flame, carefully work along and through the burner head slot with the cleaning tool provided(Note:Do not nick the edges of the slot.The cleaning tool resembles a strip of thin filter paper.Do not use other tools to clean inside the burner slot since they may have burrs that could nick the slot.

If the cleaning is not valid, you have to clean the burner head, take apart and wash as follows:

1. Pull the bolt on the burner head from the combustion chamber, and lift bruner head away from the premixed chamber.
2. Remove the four screws on the board of the burner head,bolt located on side plate as well(please remember the place where you remove the bolt)
3. Remove the two screws located on the side of the side plate (remember the installing positon of the two mats)
4.Clean the two side blocks and burner head block in a solution of 5% nitric acid for 30 minutes, rinse with water then rinse them well with deionized water.
5. Put a piece of sandpaper on a glass desk,frict the burner solt with the sandpaper,finally clean it with deionized water.
6.Clean the 6 screws and two washers with gauze coated with ethanol
7.Reinstall the burner head(Note: No gap between the side block and the floor of the burner head)

NOTICE Burn the suction tube for 20 minutes in distilled water after the sample testing, then extinguish the flame .

Cleaning the burner

Aspirating an organic solvent

If you aspirate aqueous samples innediately after organic samples(e.g. oils or MIBK ectracts),the absorption singals can be noisy and erratic.

After aspirating organic samples,perform the procedure below to prevent contamination of subsequent aqueous samples.

1.Aspirate for 5 minutes an organic solvent that is miscible with the samples that have just been aspirated.

2.Aspirate acetone for 5 minutes

3.Finally aspirate for 5 minutes in 1%HNO_3

4.Clean the spray chamber and flow spoiler with a soft brush and a mild laboratory detergent solution.

5.After cleaning,rinse the discharge pipe thoroughly with deionized water

Aspirating high concentrations of copper,silver,or mercury solutions

Warning If you have aspirated high concentrations of copper,silver,or mercury solutions into an acetylene flame,unstable acetylides may have formed in the spray chamber.If permitted to dry,these compounds may explode.

Cleaning spray and sampling tube

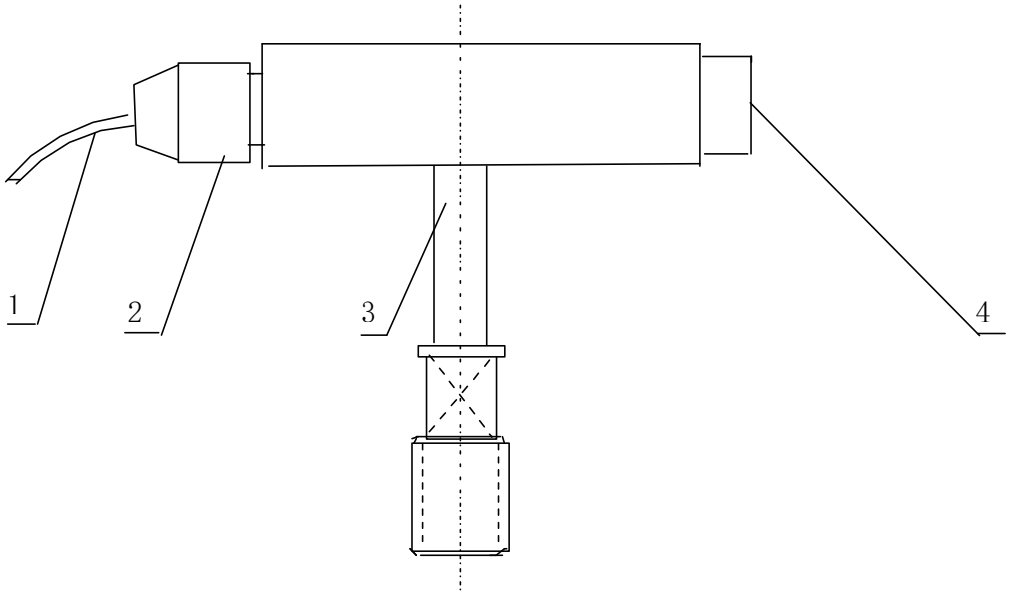
To maintain optimum nebulizer performance you must periodically clean the capillary assembly,and occasionally replace the sample tube and the PTFE tube in the capillary assembly gland nut.The nebulizer can cause low absorbance readings or poor sensitivity(e.g. cannot obtain expected characteristic concentration.

NOTICE The sample tube is in good condition(i.e no kinks),is not too long,and is clean.With a longer sample tube,the rate of sample uptake,and thus the sensitivity,will decrease. If cleaning it aspirateing solution is not valid we must clean the sampling capillary.

1. Stainless steel atomizer

Dredge capillary with φ0.3mm wire to move away solid particles. If you can not solve the problem, we must remove the nebulizer and clean it, it's structure is as shown in Figure 4-51a.

Regulator 2 is tuned well before sending it, persons who have not received adequate training do not adjust it, and not to remove it avoid damaging the capillary.



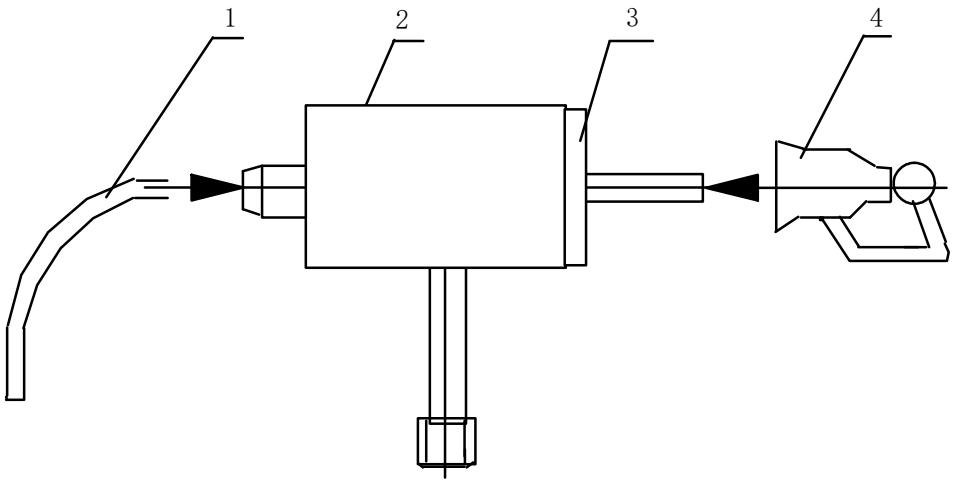
1.Sample tube 2.Regulator 3.Nebulizer side arm 4. Nozzle

Figure 4-51a Stainless Steel Nebulizer

2. Glass atomizer

a. Loosen the screw,lift up the tablet,carefully move the glass atomizer away,open the air compressor's power,insert the sample tube(1) into the deionized water, gently turn the disperse ball(4) （Figure 4-51b） to make the spray up to the best state

b. When there is debris in the sample tube, similarly, carefully move away the disperse ball (4) ,open the air compressor's power,insert the sample tube(1) into the deionized water, block the nozzle with your fingers for a few seconds, quickly let go, until all the debris blown out from the tube.



1.Sample tube 2.Body 3.O-ring 4. Disperse ball

Figure 4-51b Glass Atomizers

Chapter 5 Performing Analyses

Reading Abs

Take the Cu lamp 1 as an example,lamp.The method of reading Abs only can be used in testing sample's absorbance under some condition.If you want to test the concentration of some element you must use straight line or curve or other calibration method of single-point quantitative analysis

1.Aligning lamps(see "Aligning lamps")

2.Flaming the fire(see"Flaming")

3.Input the appropriate 'Read Time" value in the "Instrument Page" window,select appropriate "Reading Mode"(Figure 5-1a")

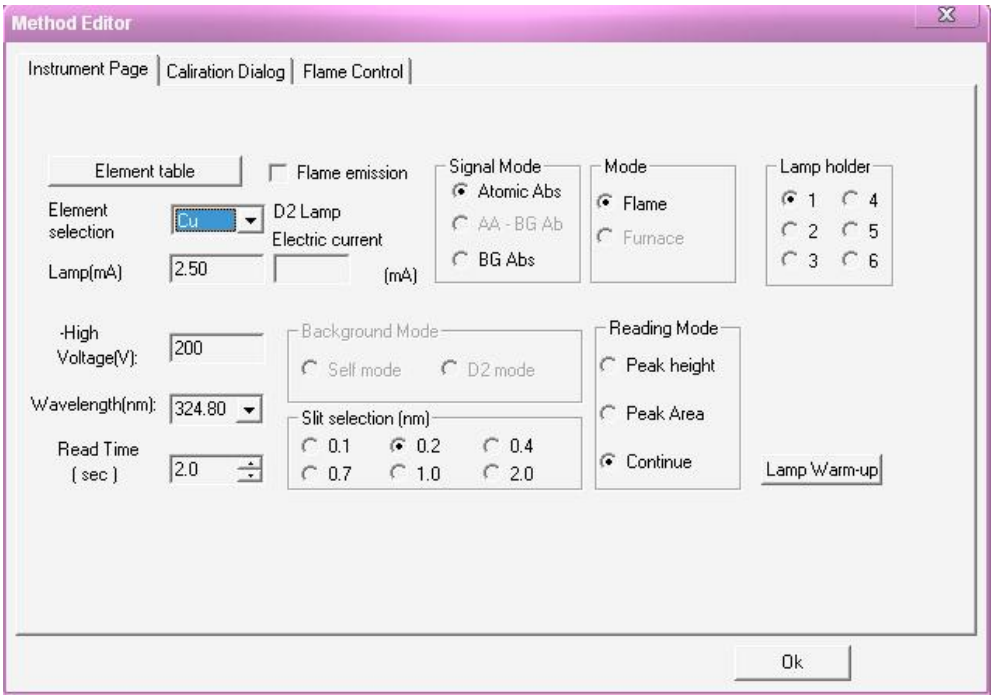


Figure 5-1a

4.Select "Quantification Analysis" in the "Measurement Mode" (Figure 5-1a")

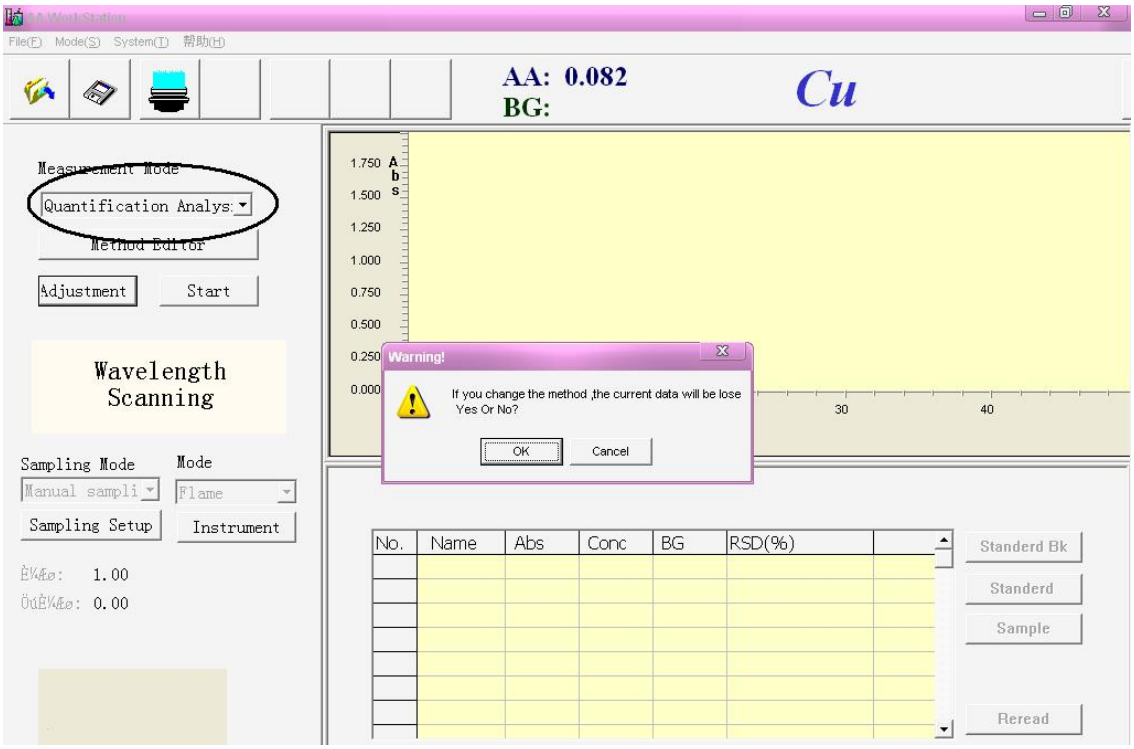


Figure 5-1b

5.Press【OK】

6. Press【Method Editor】,open"Calibration Dialoge"window (Figure 5-2)

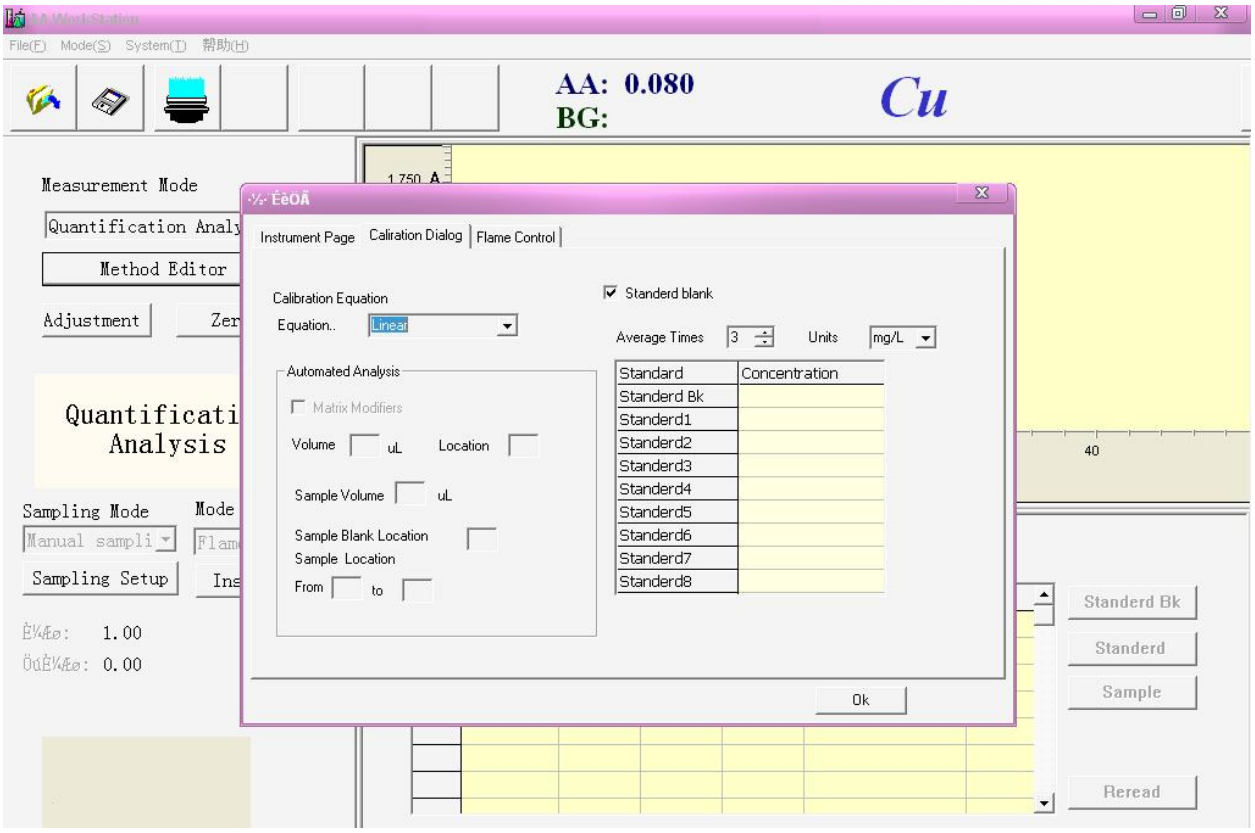


Figure 5-2

7.Select the "Read Abs"in the "Calibration Equation"(Figure 5-3)

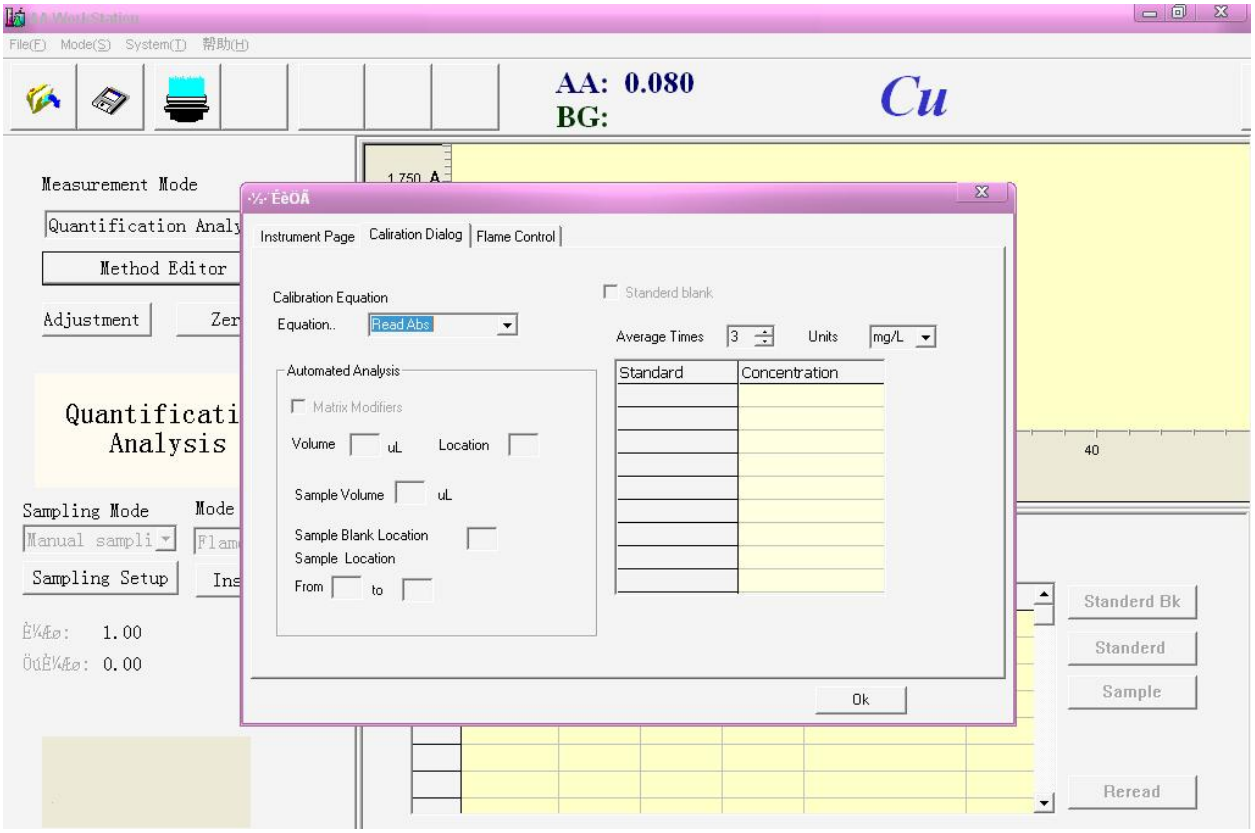

AA: 0.080
BG:
Cu
Measurement Mode
Quantification Analy
Method Editor
Adjustment
Quantificati
Analysis
Sampling Mode
Manual sampli
Sampling Setup
Instrument Page
Caliration Dialog
Flame Control
Calibration Equation
Equation..
Read Abs
Standerd blank
Average Times
3
Units
mg/L
Automated Analysis
Matrix Modifiers
Volume
uL
Location
Sample Volume
uL
Sample Blank Location
Sample Location
From
to
Standard
Concentration
Ok
Standerd Bk
Standerd
Sample
Reread

Figure 5-3

8.Press【OK】button to close the dialoge box,"Sample" button brighten(Figure 5-4)

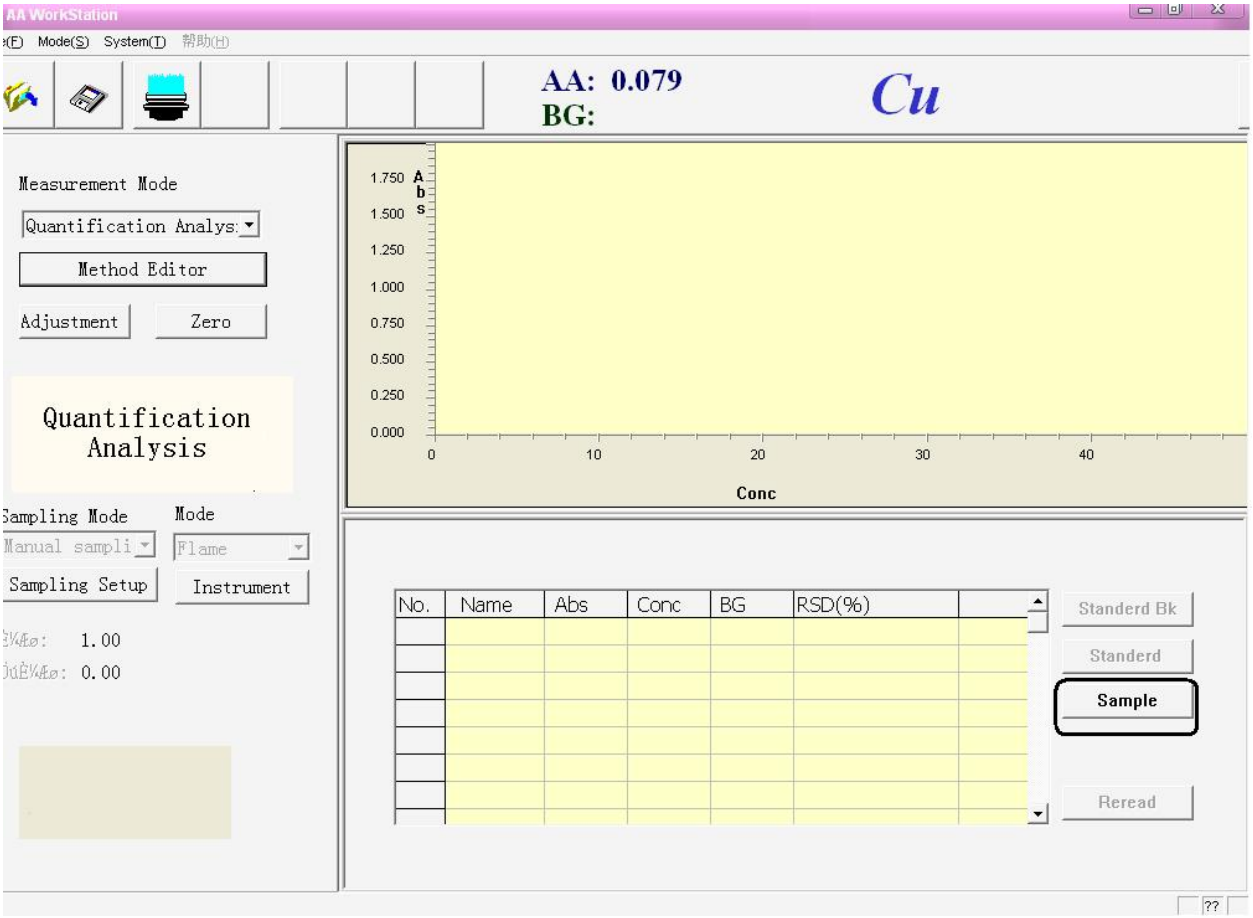


Figure 5-4

9.Press【Zero】,after the zero and real-time value becoming stable,press 【Sample】,display figure 5-5

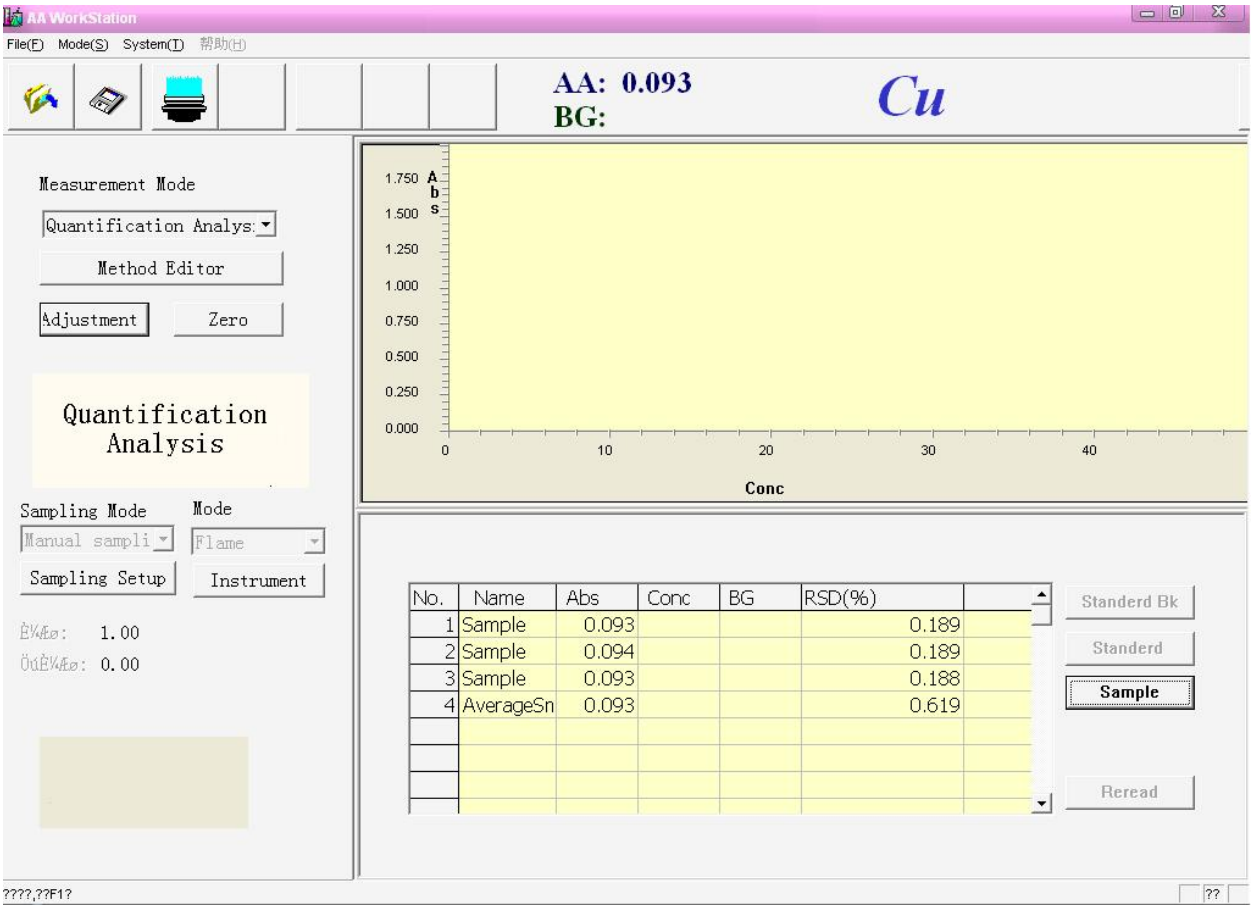


Figure 5-5

10. Press 【Sample】again,start the second sample

11.You can repeat the sample testing according to your need

12.If you aren't satisfied with the measurement result you can test again

Linear Calibration

Linear method is the most commonly standard curve method used in quantitative analysis, suitable for element sample's quantitative analysis which standard curve is good linear

Take Cu lamp 1 as an example

1. Aligning lamps.see" Aligning lamps"

2. Flaming the fire(see"Flaming")

3. Input the appropriate"Read Time" in the "Instrument Page",select appropriate "Reading Mode" (Figure 5-6)

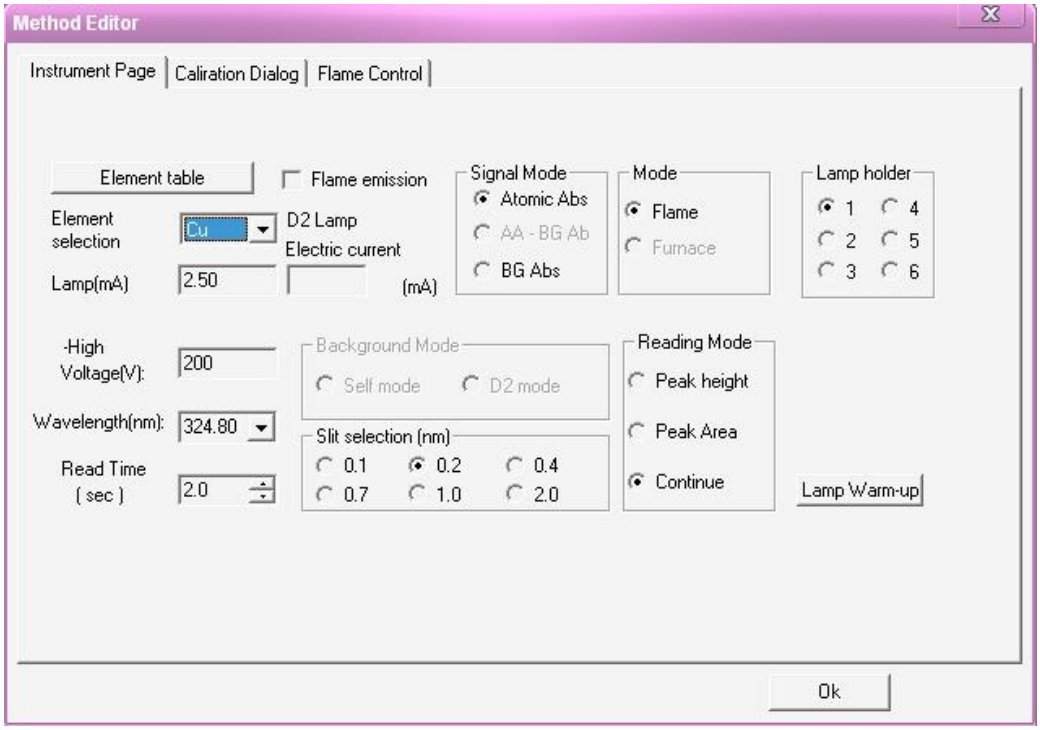


Figure 5-6

4. Figure 5-7, select the "quantification analysis" from the "Measurement Mode",then, press 【OK】

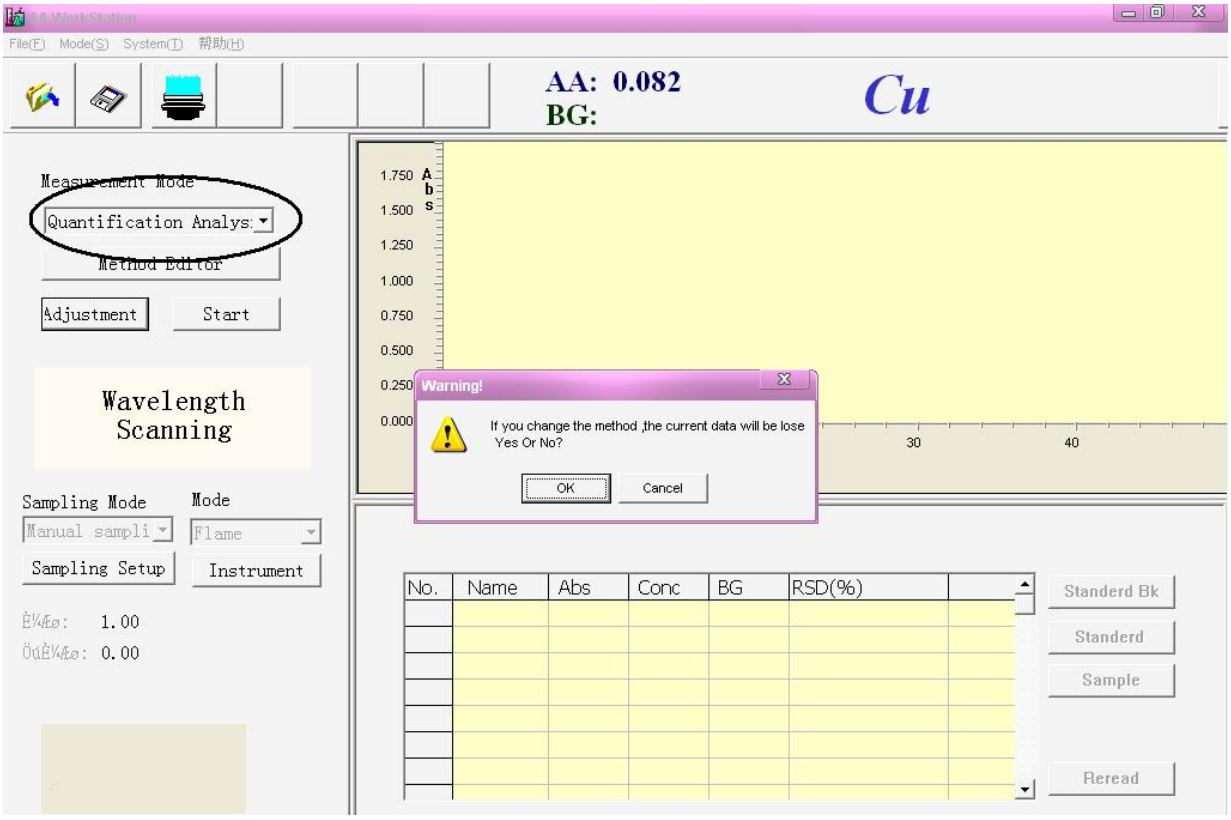


Figure 5-7

5.Press【OK】,open the “Calibration Dialoge”window.figure 5-8

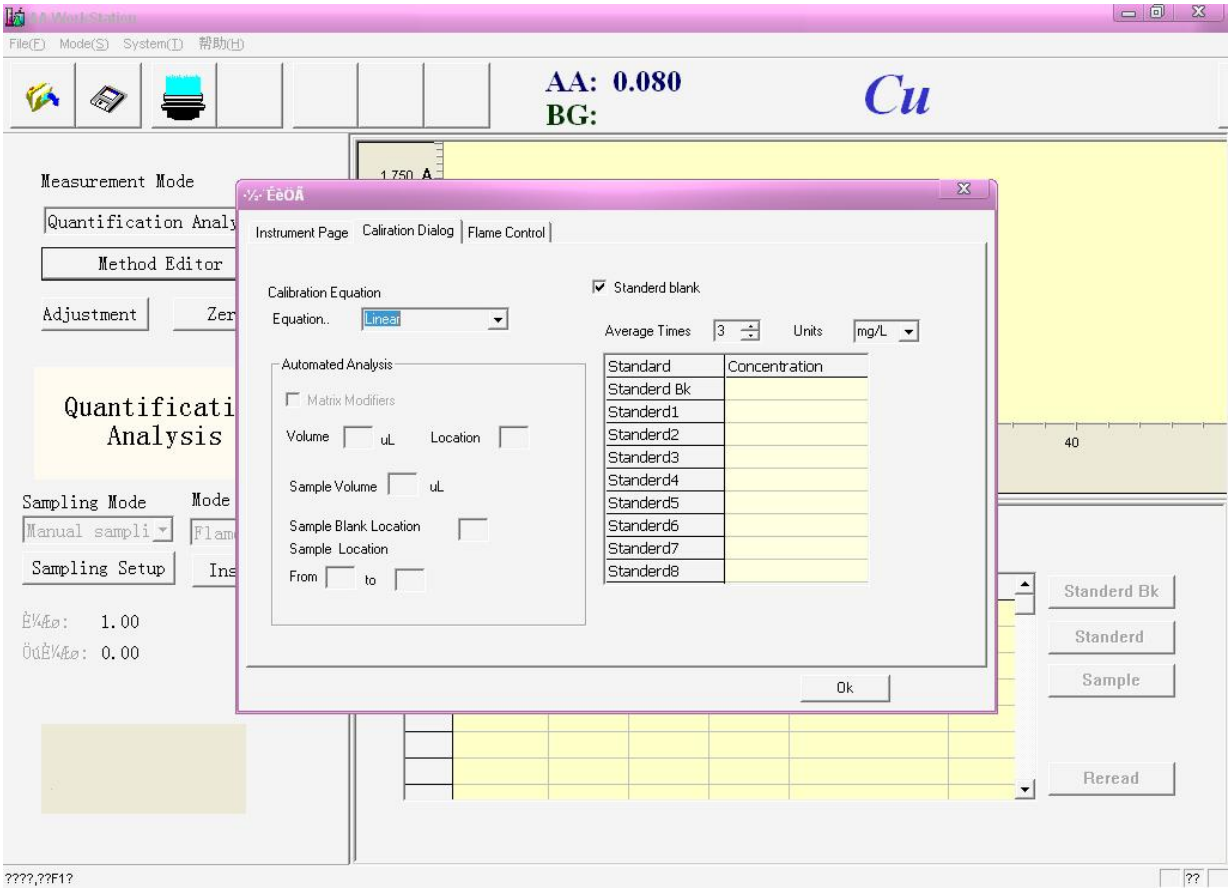


Figure 5-8

6.Select the “Linear”in the “Calibration Equation”,figure 5-9(notice:at least input 2 standard samples

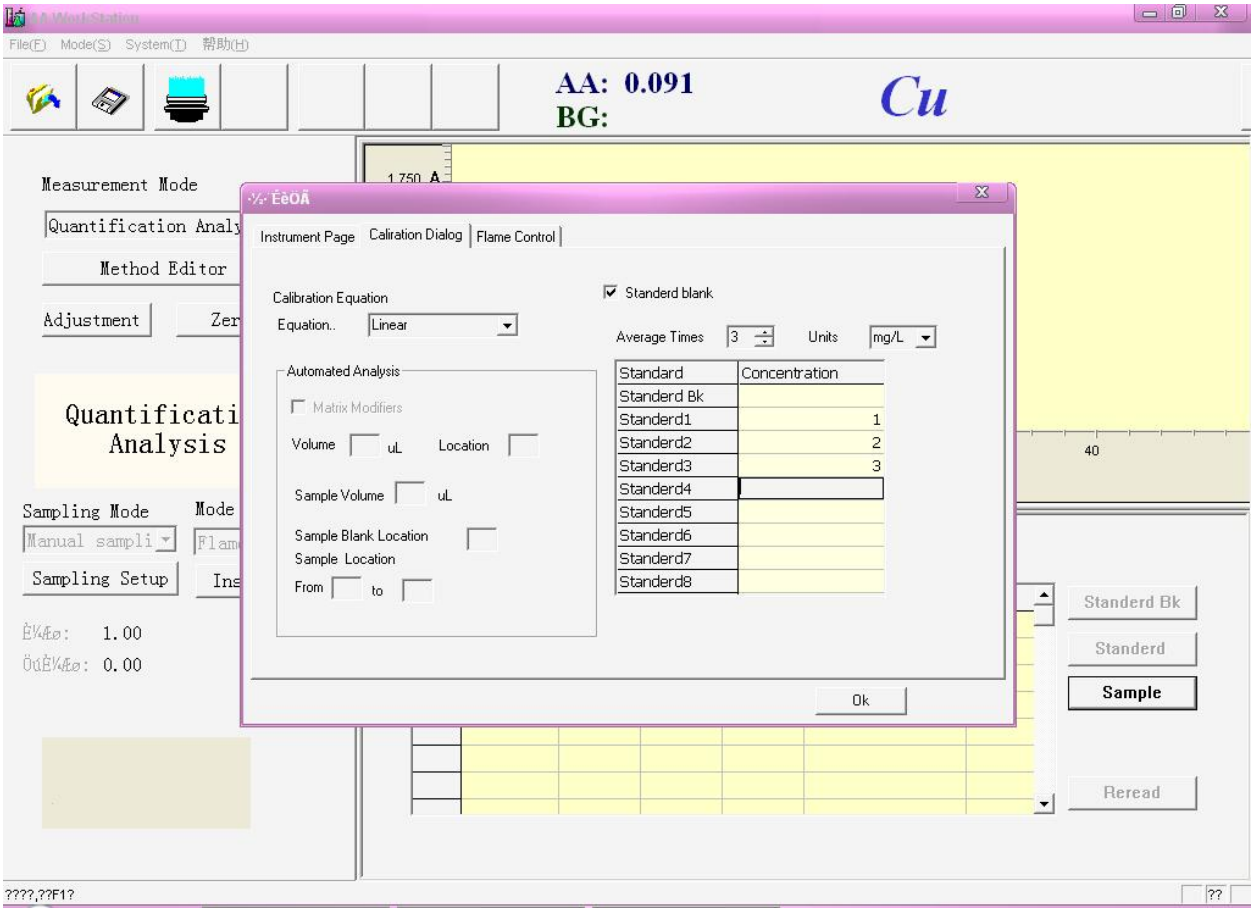


Figure 5-9

7. Press【OK】,close the dialoge box,"Standard Bk"brighten.figure5-10

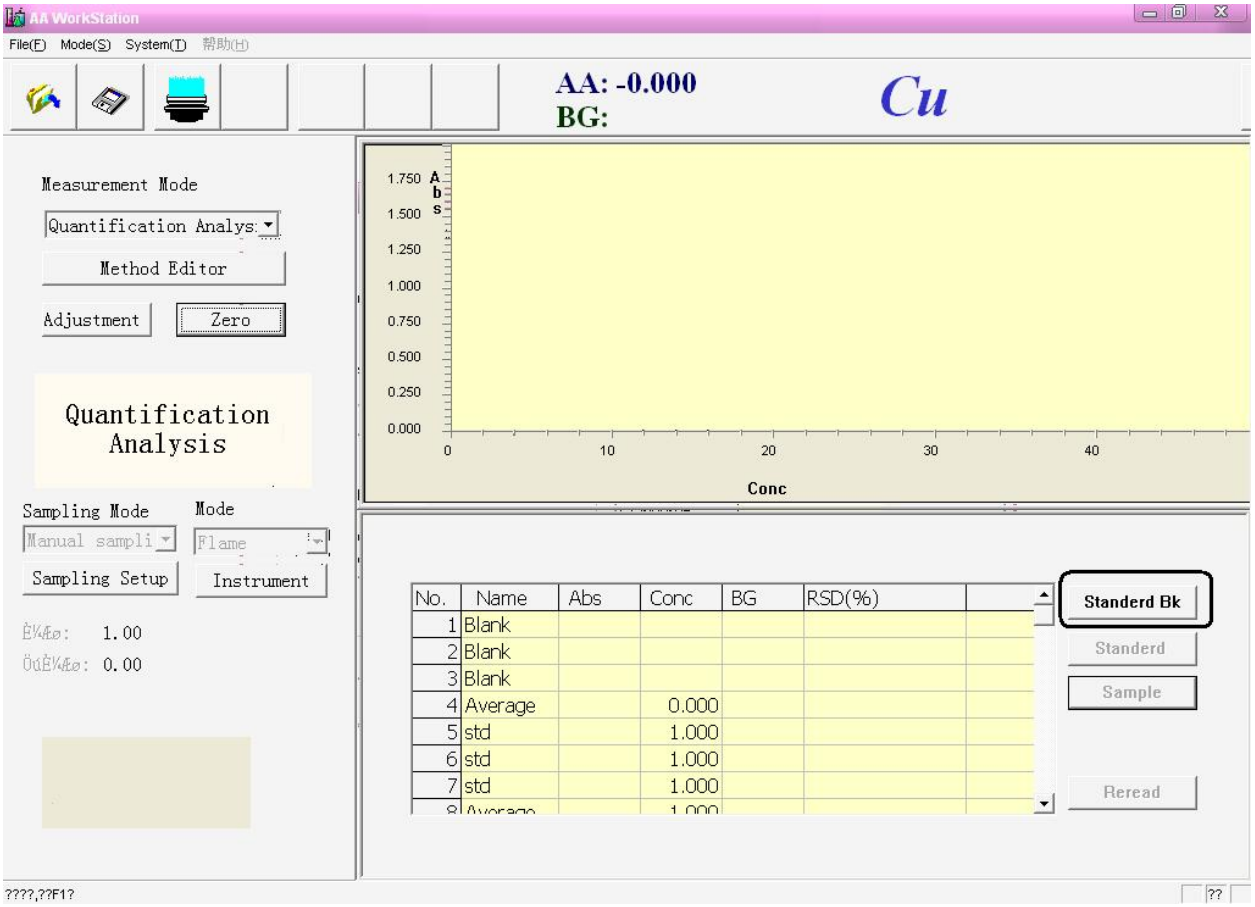


Figure 5-10

NOTICE: If the standard blank and sample blank are not the same systematic substance you must do the blank calibration

If the concentration of the standard blank sample is different with the concentration of the deionized water,select the"Standard BK"

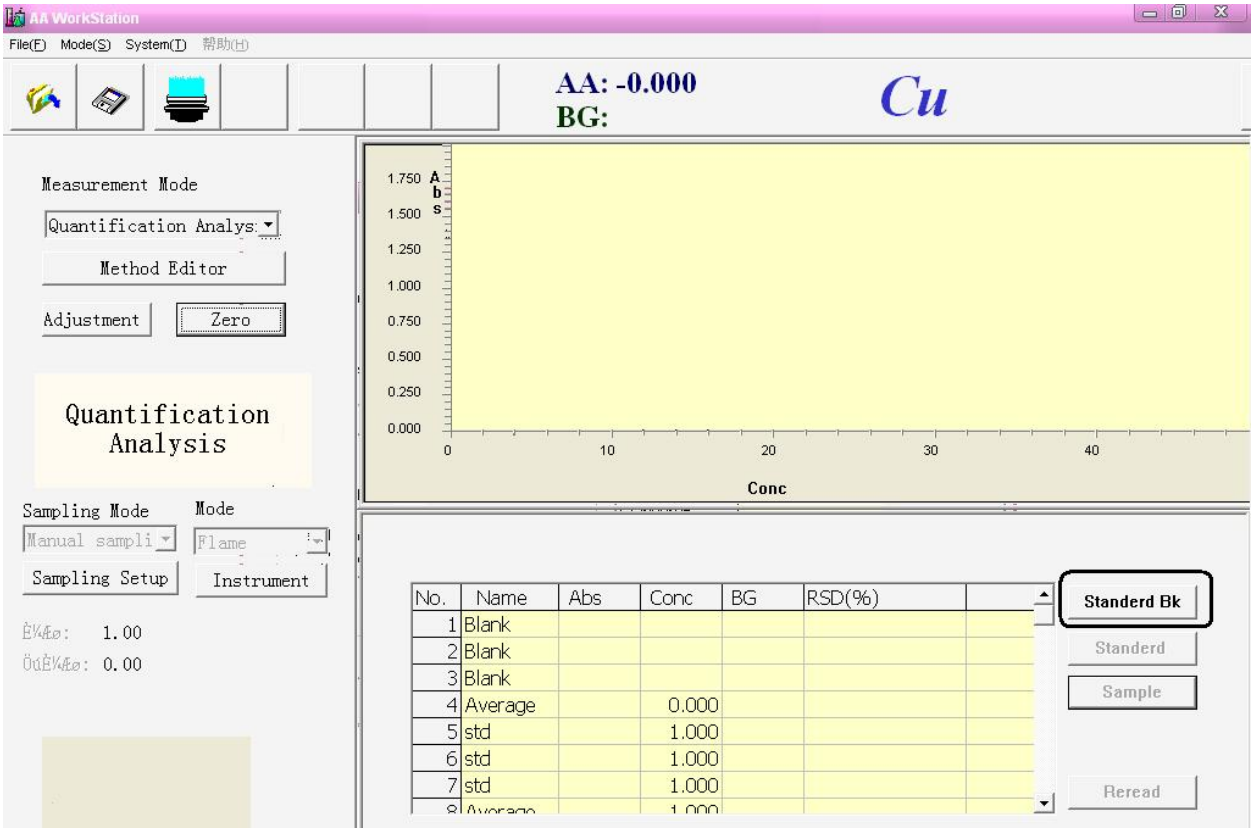


Figure 5-10

8.Absorbing de-ionized water,Press"Zero" button,after this, spurt and absorb standard sample blank, press 【Standard Bk】 button, shown in Figure 5-11.

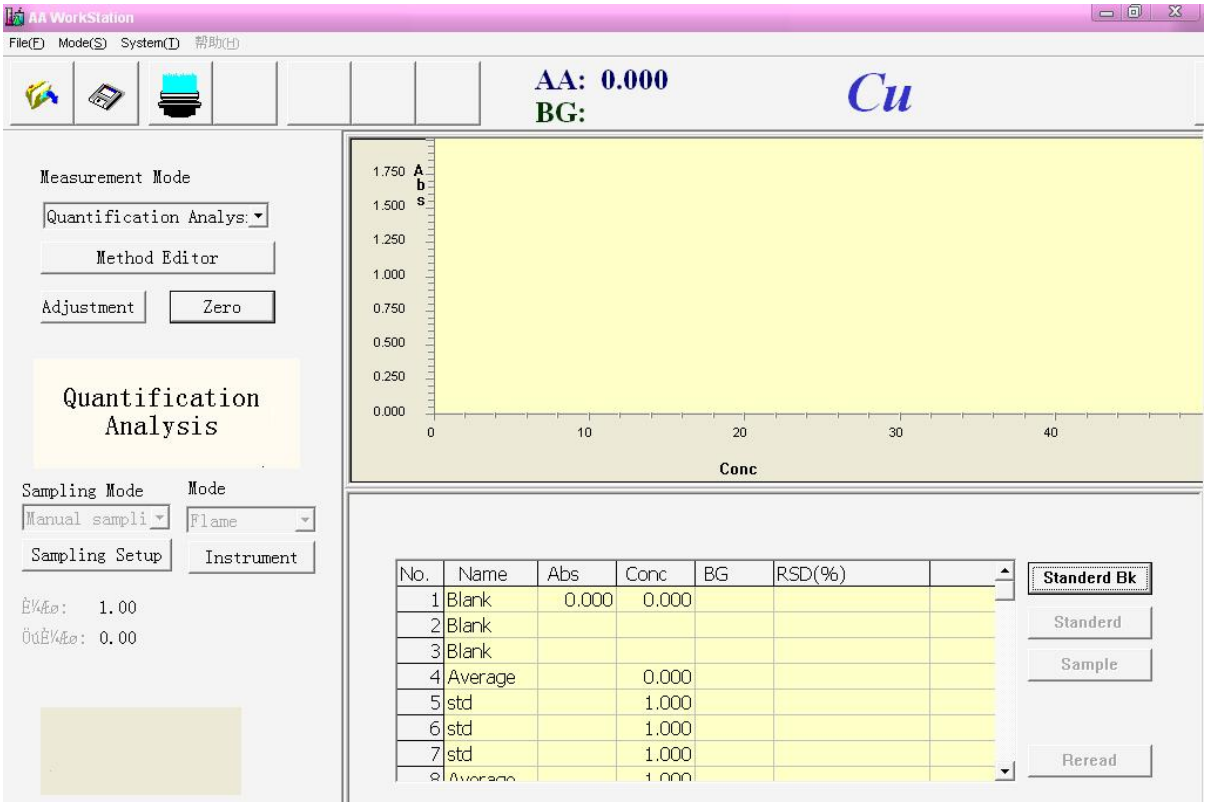


Figure 5-11

9.Spurt and absorb standard asmple bland again,press 【Standard Bk】 button, shown in Figure 5-12,finish the test of standard blank

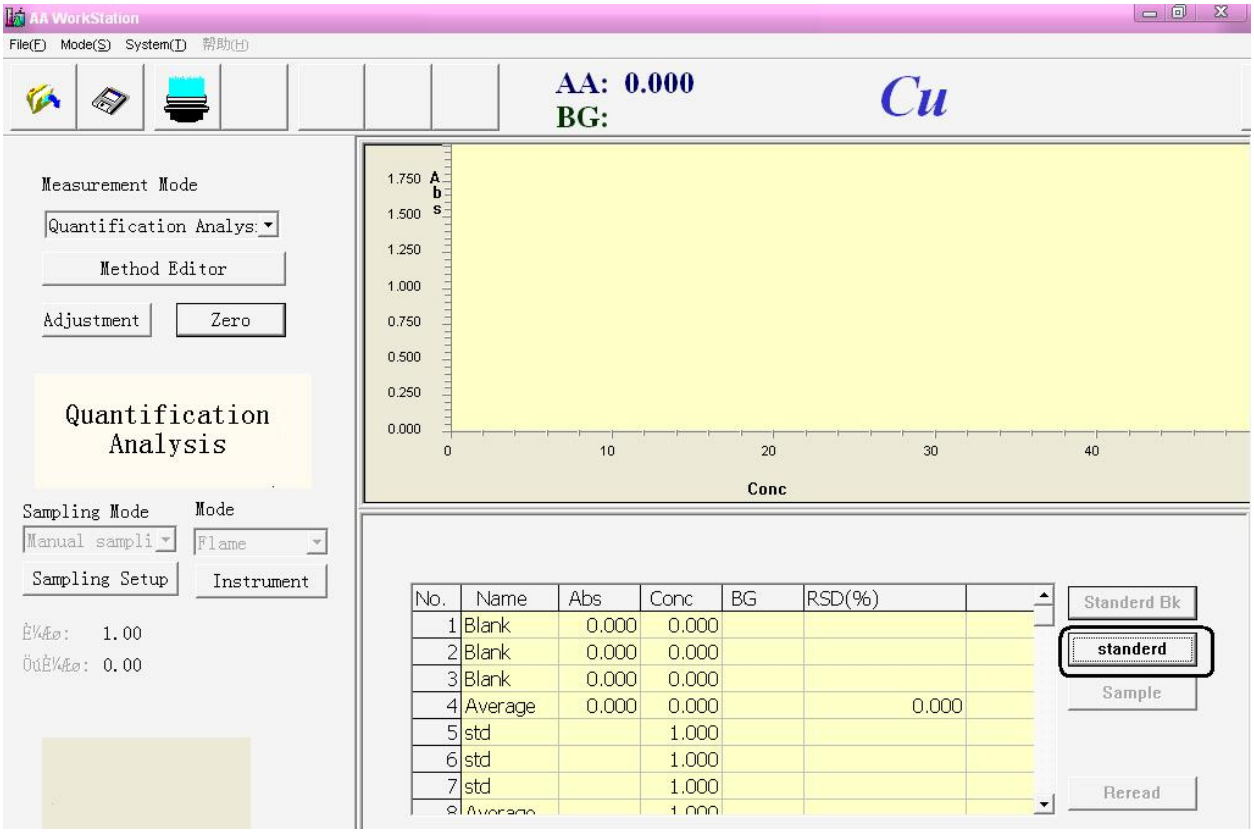


Figure 5-12

10. Spurt and absorb standard asmple bland 1, press 【Standard】 button, shown in Figure 5-13

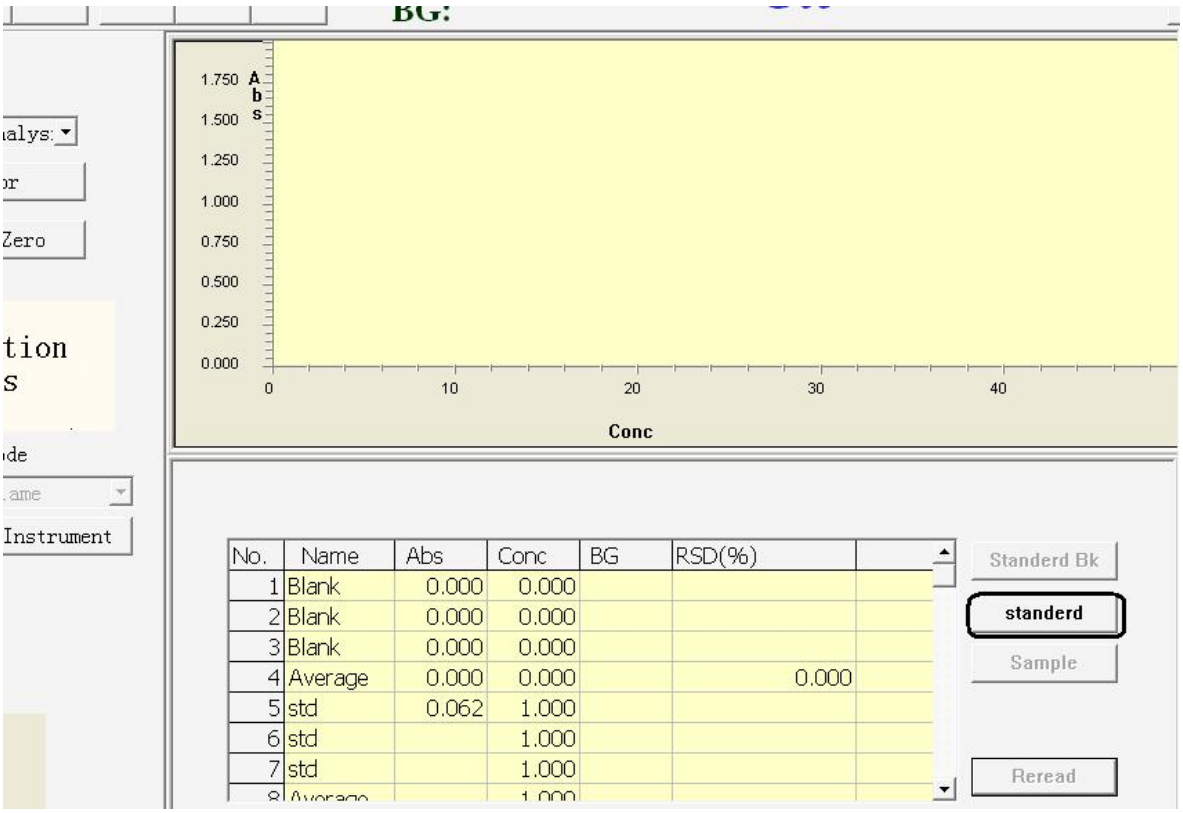


Figure 5-13

11. Spurt and absorb standard asmple bland 1 again, press 【Standard】 button, shown in Figure 5-14

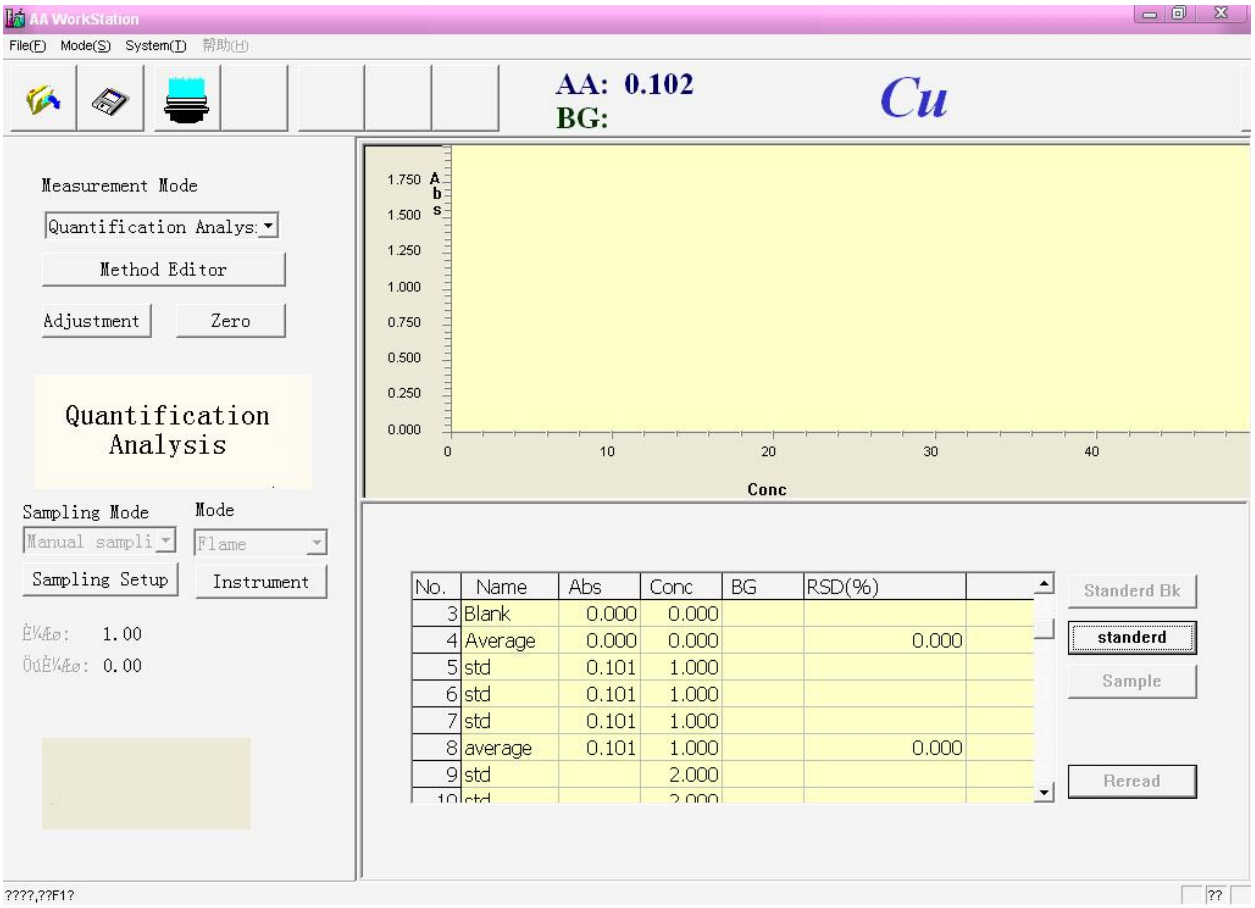


Figure 5-14

12.Follow this process testing the other two standard sample,after the testing,display the figure 5-15

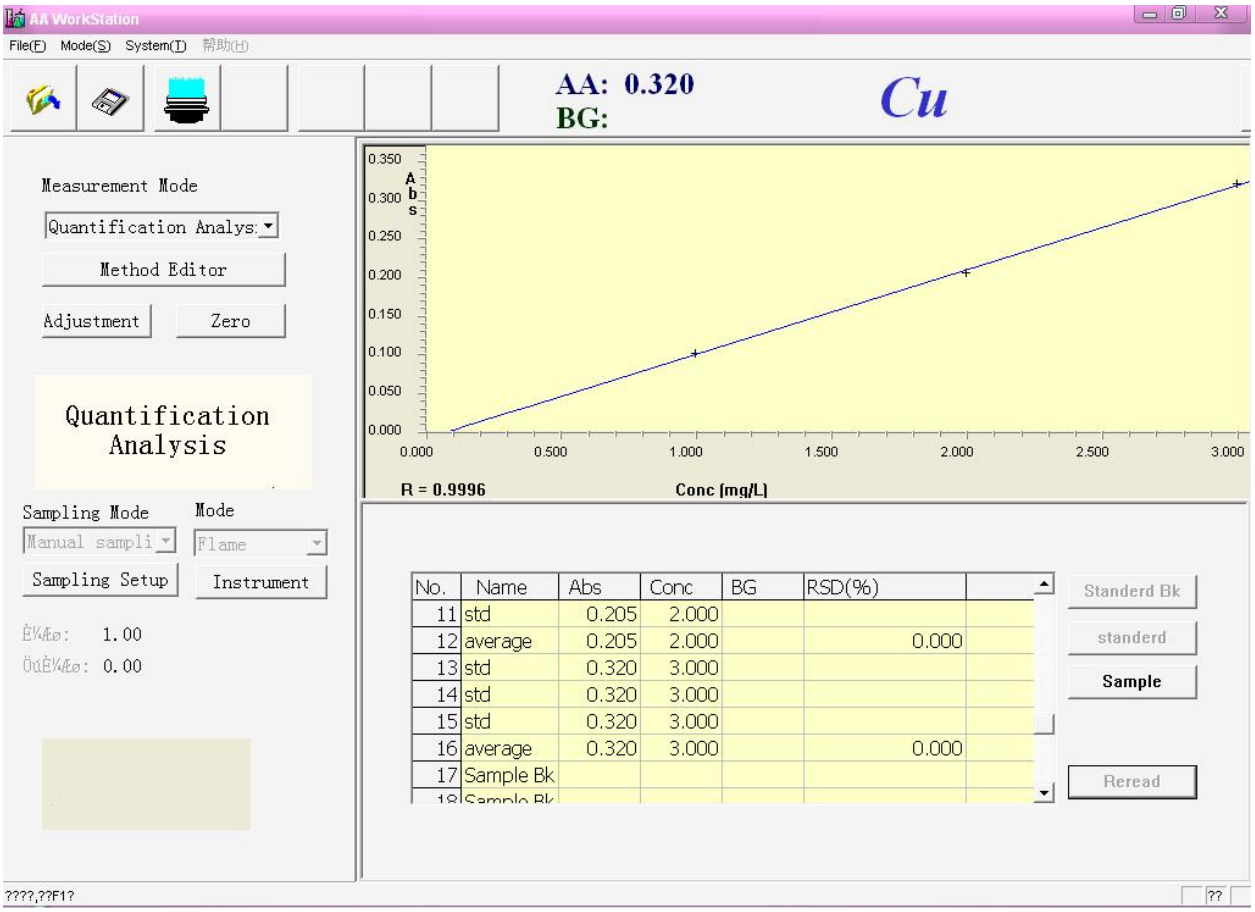


Figure 5-15

13.If you are not satisfied with the measurement result you can test again.

14.Start testing other samples,the same as the method above

15. After establishing the standard curve, click on the mouse rightly display the Figure 5-15a,The user can change at any time curve fitting method (linear, curve correction), as shown in the figure selecting curve calibration is curve fitting method.

Nonlinear Calibration

It is suitable for the quantitative analysis for nonlinear element

Take Cu lamp 1 as an example

1. Aligning lamps.see" Aligning lamps"

2. Flaming the fire(see"Flaming")

3.Input the appropriate"Read Time" in the "Instrument Page",select appropriate "Reading Mode"

4. Figure 5-16, select the "quantification analysis" from the "Measurement Mode"

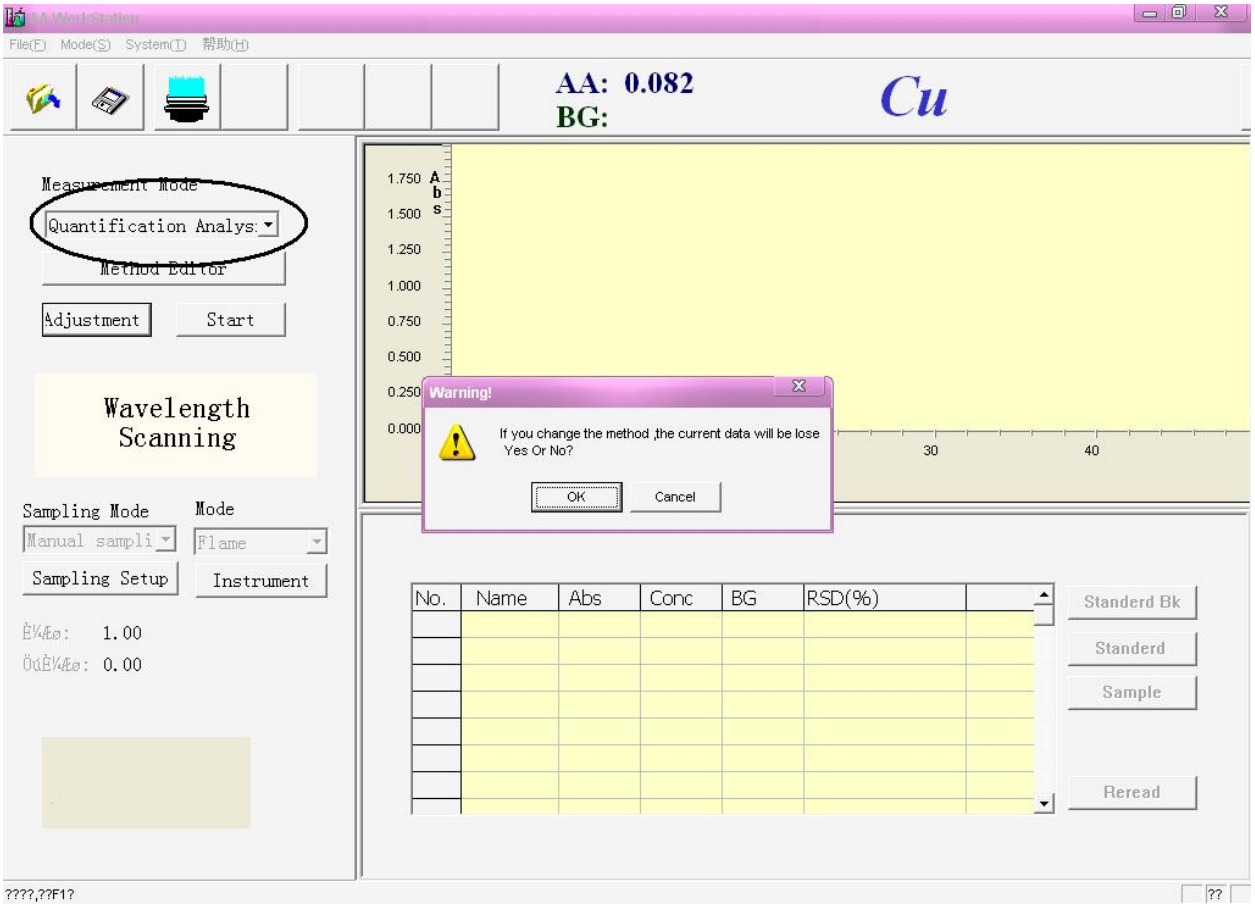


Figure 5-16

5. Press【OK】,open the “Calibration Dialoge”window.figure 5-17

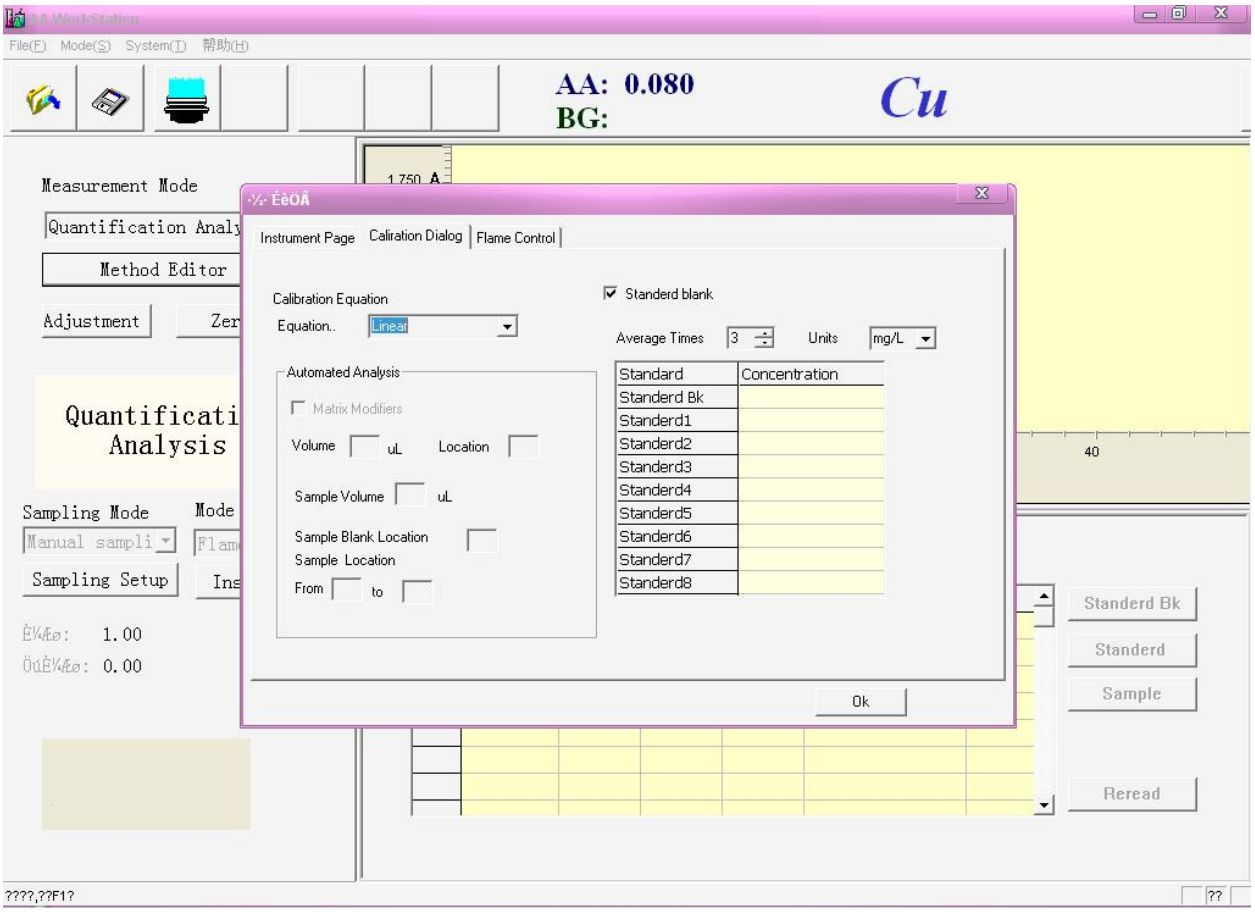


Figure 5-17

6. Select the “Nonlinear”in the “Calibration Equation”,figure 5-18

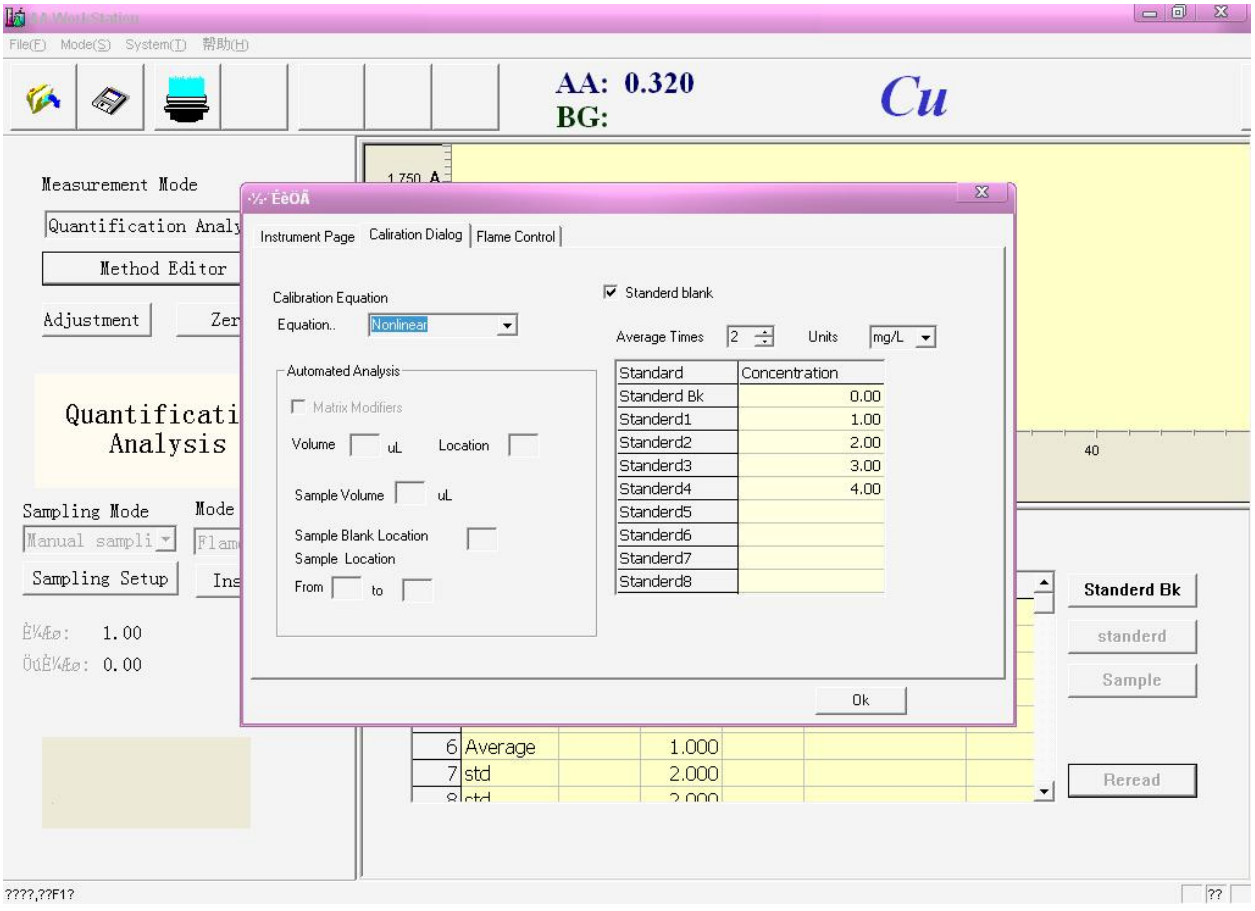


Figure 5-18

NOTICE at least input 3 standard samples

7.The testing method is the same as the “linear calibration”

8. If you are not satisfied with the measurement result you can test again.

9.After the standard sample testing,display the figure5-19

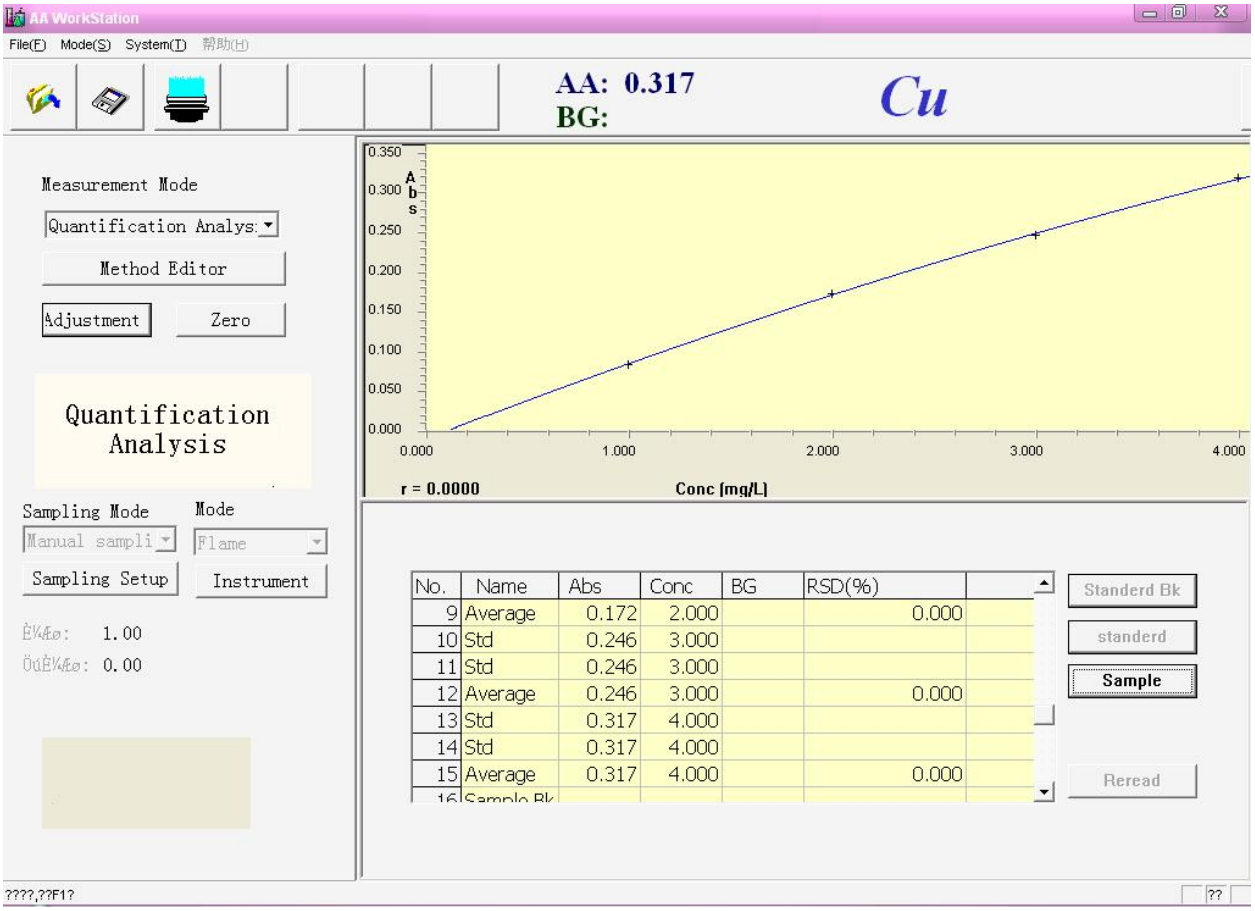


Figure 5-19

10. Start testing other samples,the same as the method above

Method of Addition(Linear)

The method allows you accurately analyze samples where the sample matrix has a significant effect on the slope of the calibration curve,an effect that is different for each sample.It includes linear and nonlinea

Take Cu lamp 1 as an example

1. Aligning lamps.see” Aligning lamps”

2. Flaming the fire(see”Flaming”)

3.Input the appropriate“Read Time” in the “Instrument Page”,select appropriate “Reading Mode”

4. Figure 5-20, select the “quantification analysis” from the “Measurement Mode”

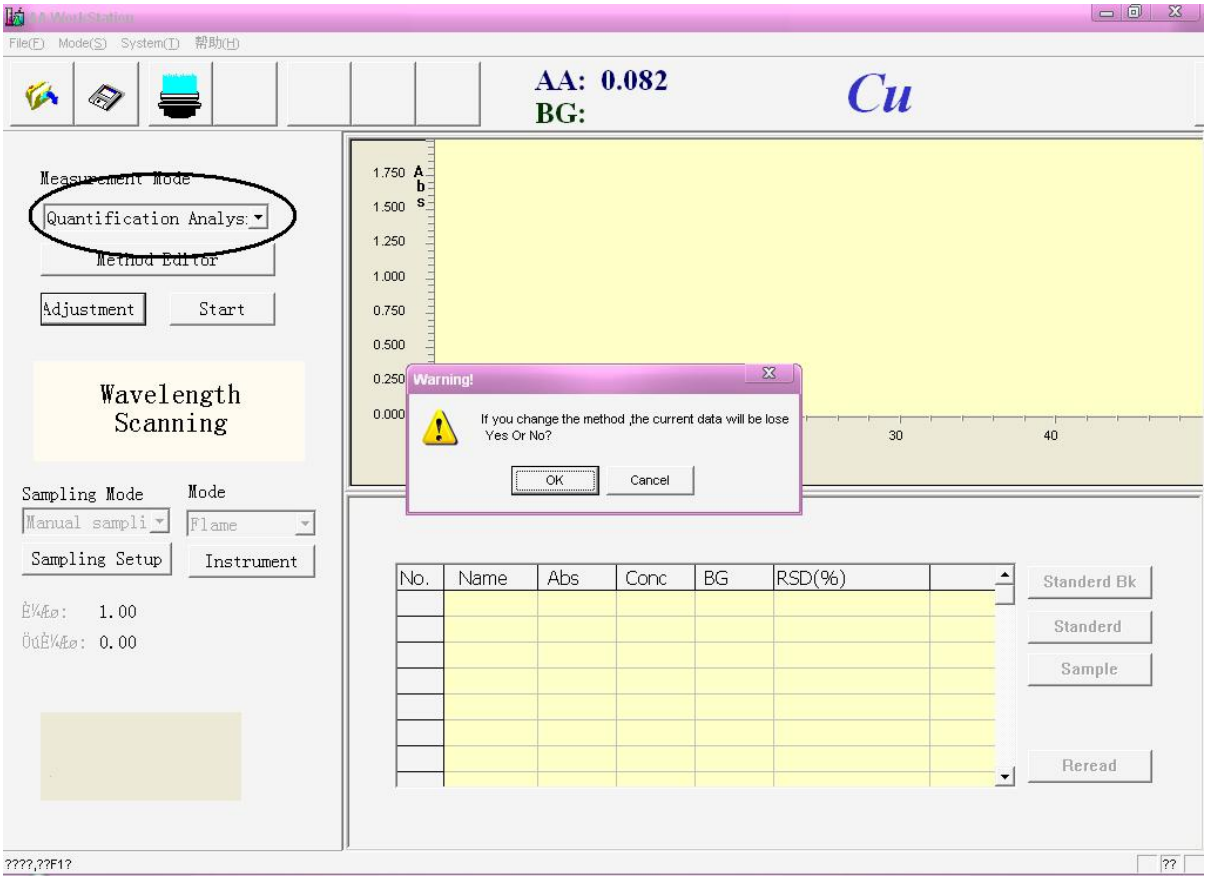


Figure 5-20

5. Press【OK】,open the “Calibration Dialoge”window.figure 5-21

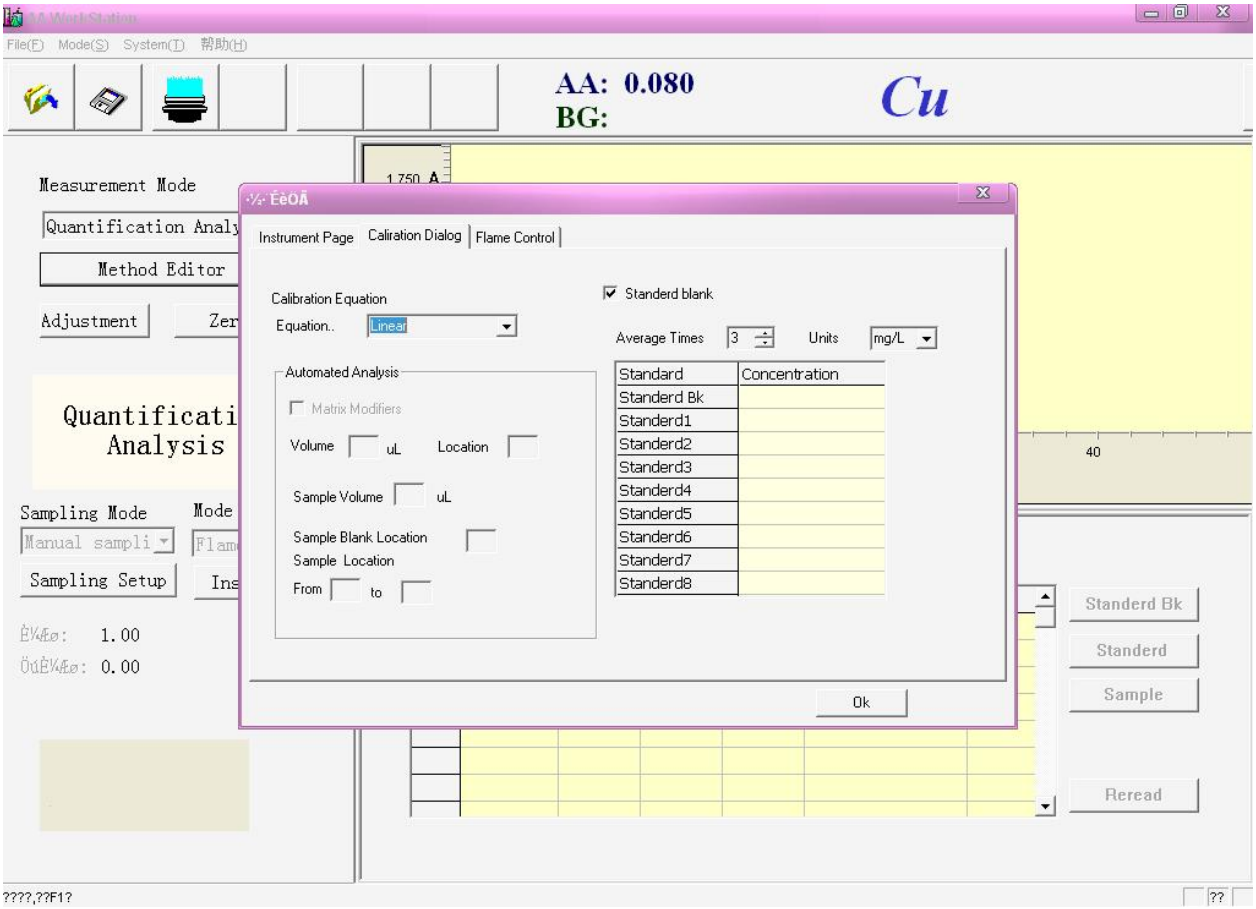


Figure 5-21

6. Select the “Meth.of Addition Linear”in the “Calibration Equation”,figure 5-22(Notice:at least input 2 standard samples)

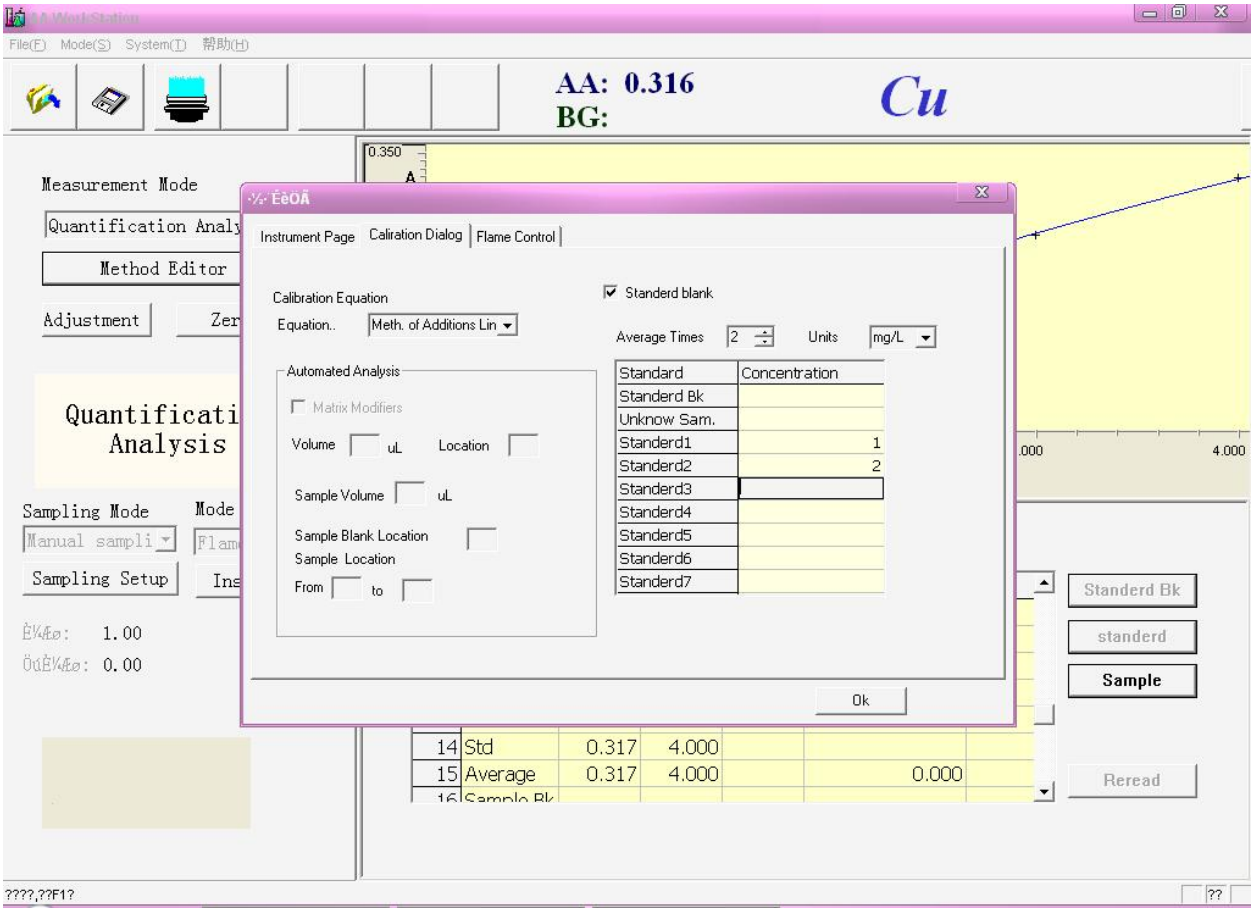


Figure 5-22

7.Press【OK】,close the dialog,”Standard Bk”brighten,figure 5-23

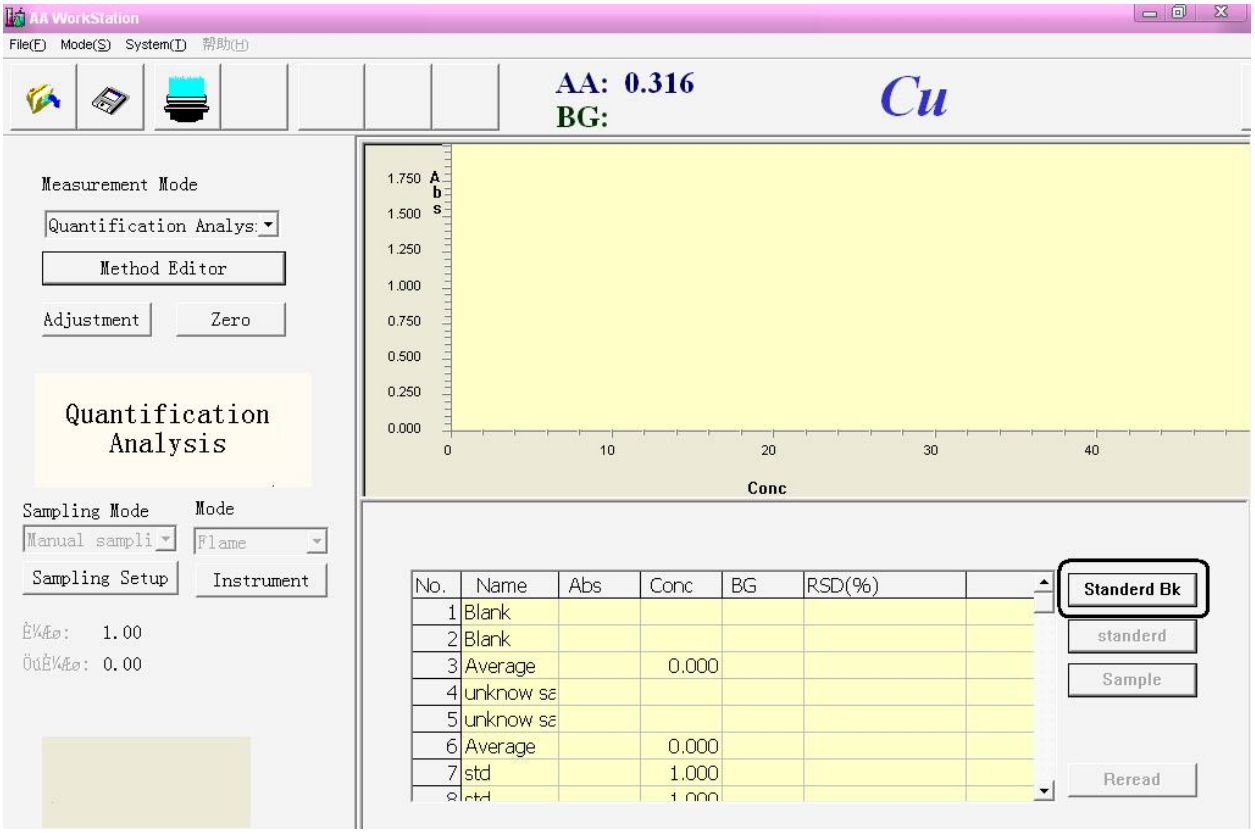


Figure 5-23

8. Absorbing de-ionized water,press"Zero" button,

9.Spurt and absorb standard blank sample, press 【Standard Bk】 button, shown in Figure 5-24

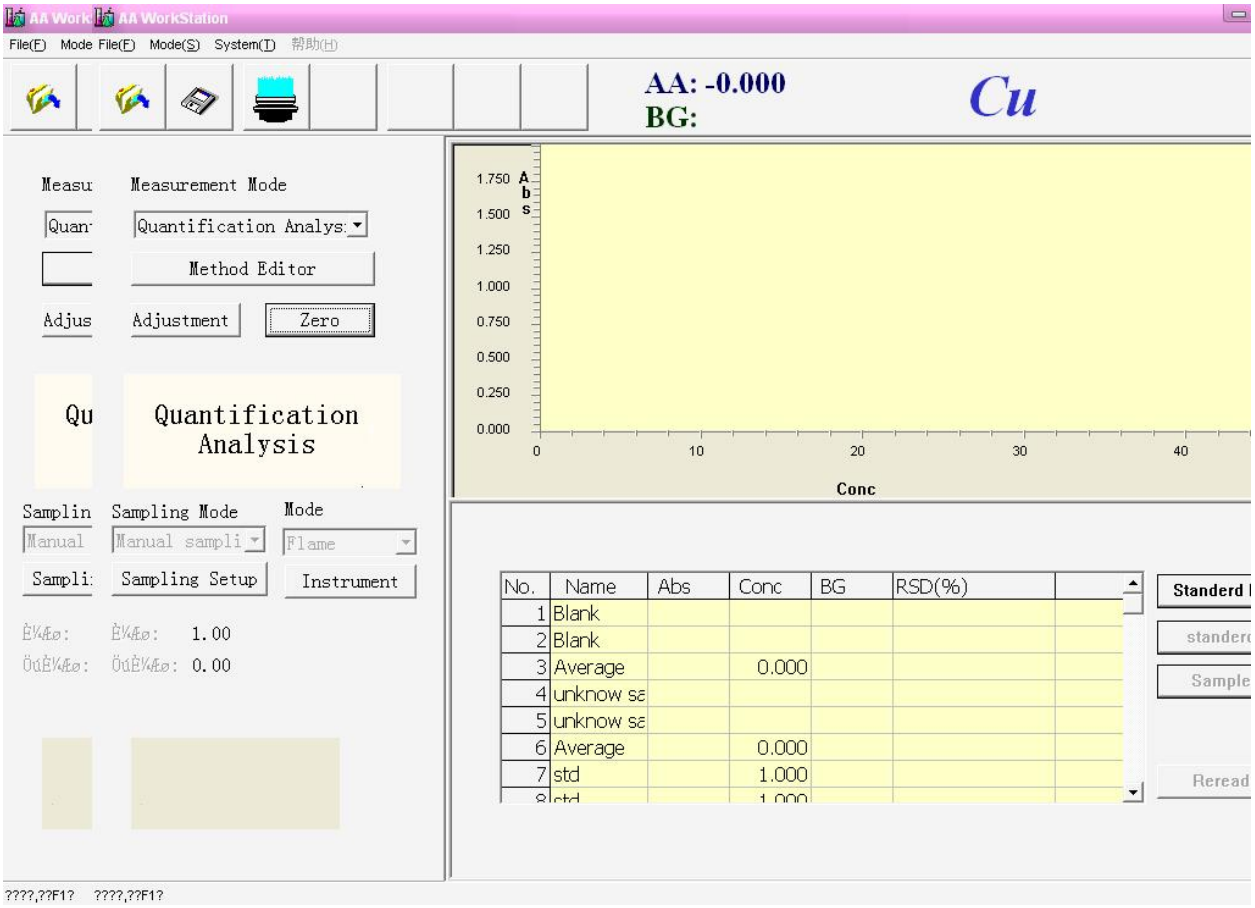


Figure 5-24

10. Spurt and absorb standard blank sample again,press 【Standard Bk】 button, shown in Figure 5-25

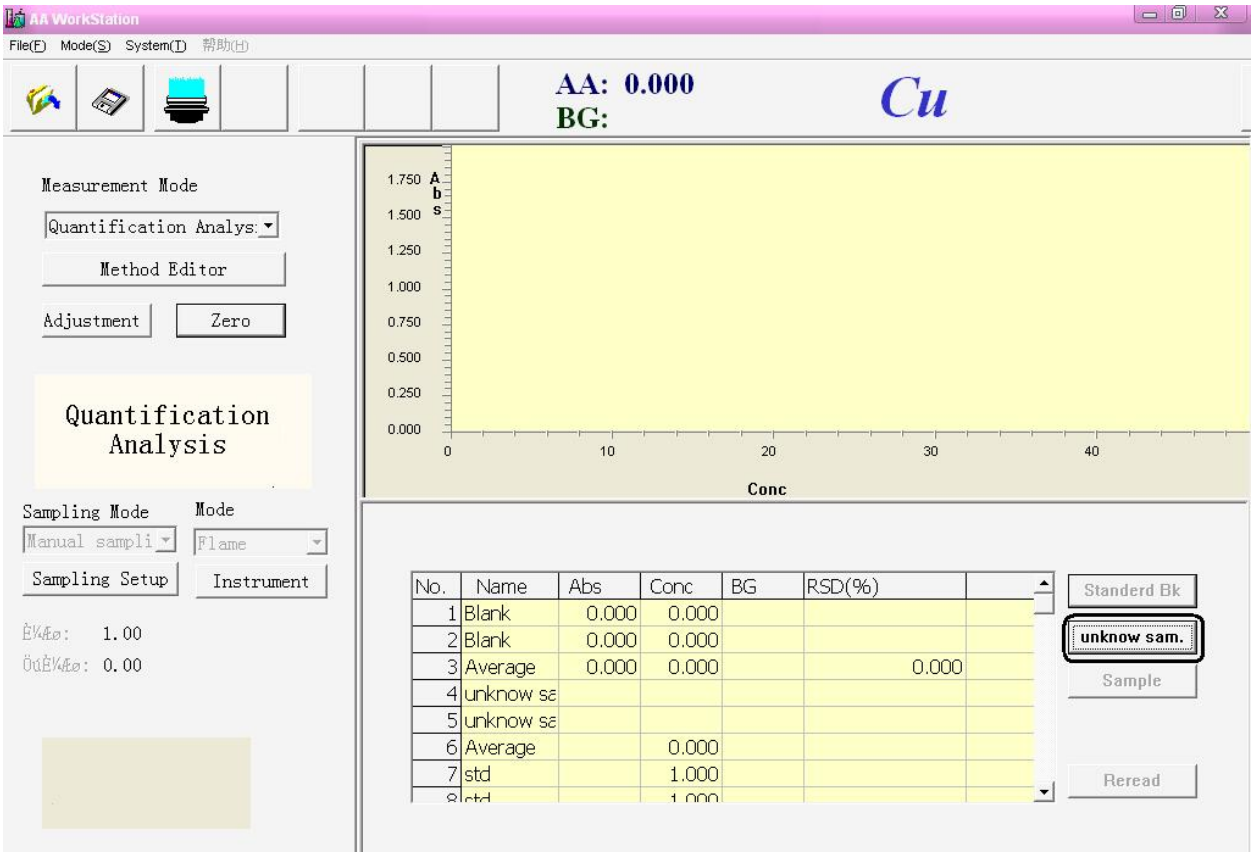


Figure 5-25

11.Start to test unknown sample.spurt and absorb the unknown sample,press【unknown sam.】,display the figure 5-26

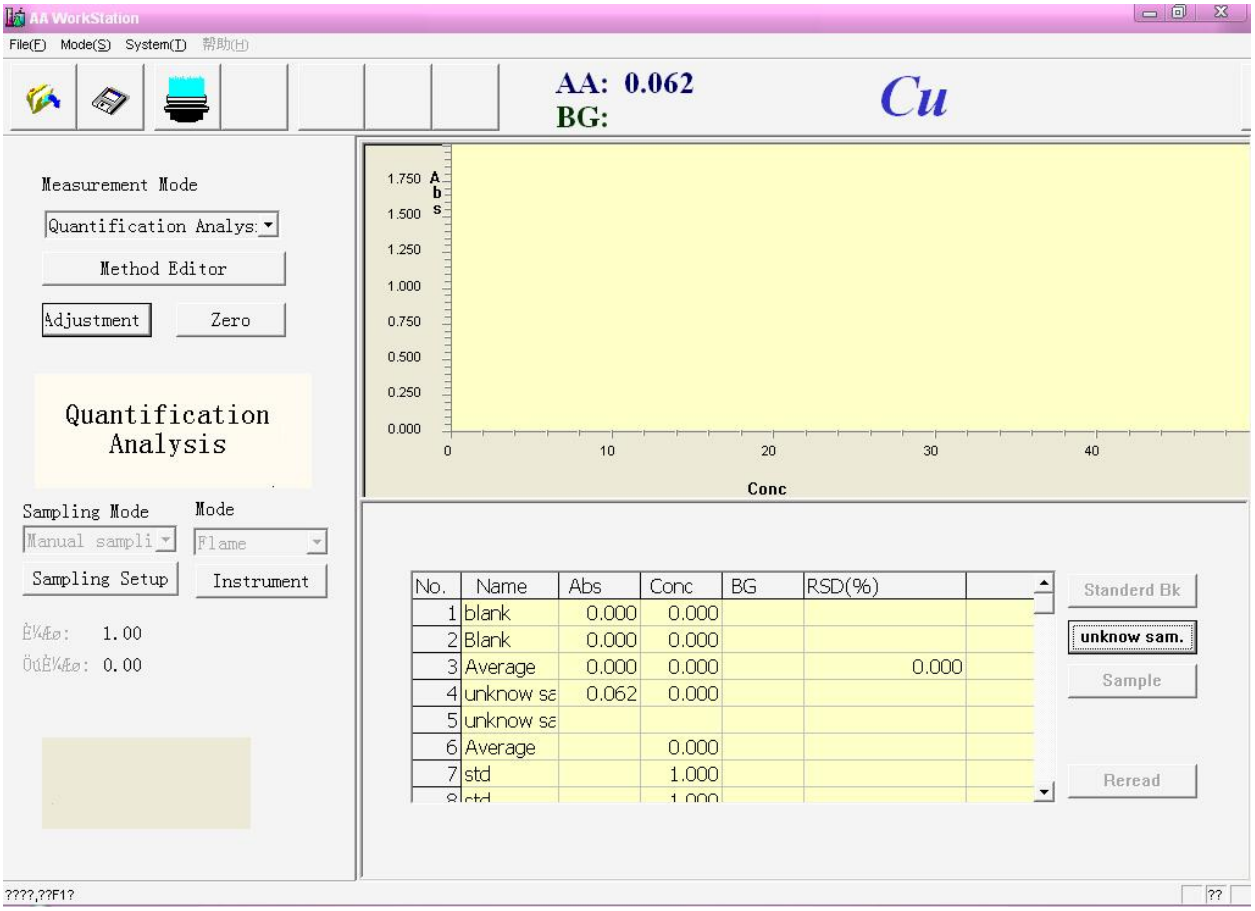


Figure 5-26

12. Spurt and absorb the unknown sample again,press【unknown sam.】,display the figure 5-27

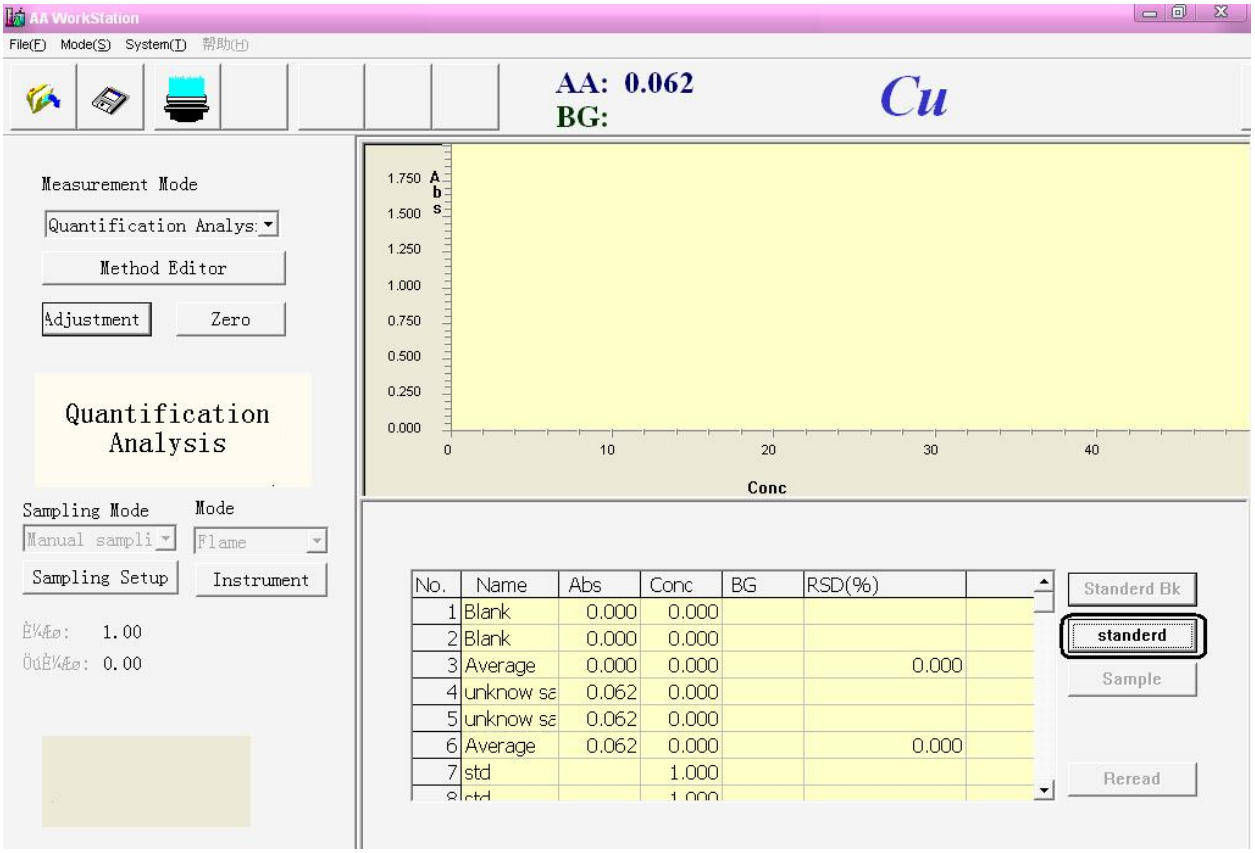


Figure 5-27

13. .Follow this process testing the other two standard sample,after the testing,display the figure 5-28.The concentration of the unknown sample has already be calculated in the figure when the standard sample has been tested

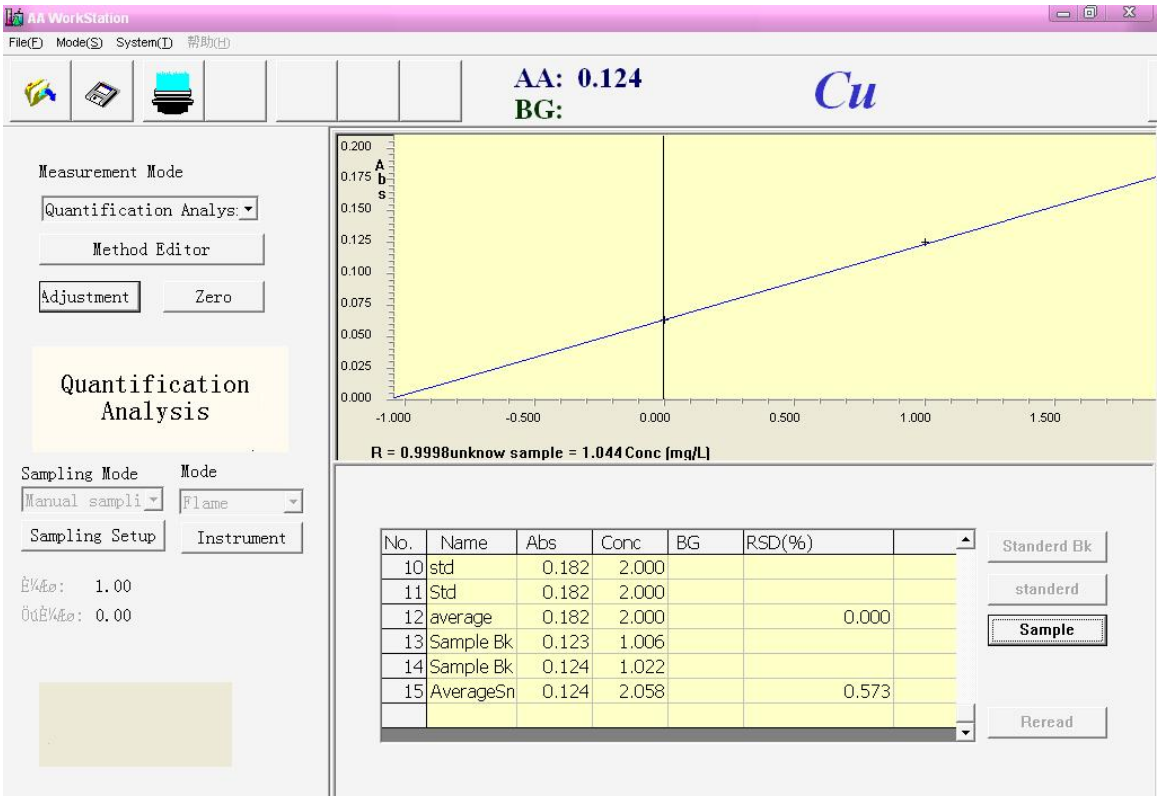


Figure 5-28

14. If you are not satisfied with the measurement result you can test again.

9. Start testing other samples,the method is the same as the unknown sample testing,figure 5-29

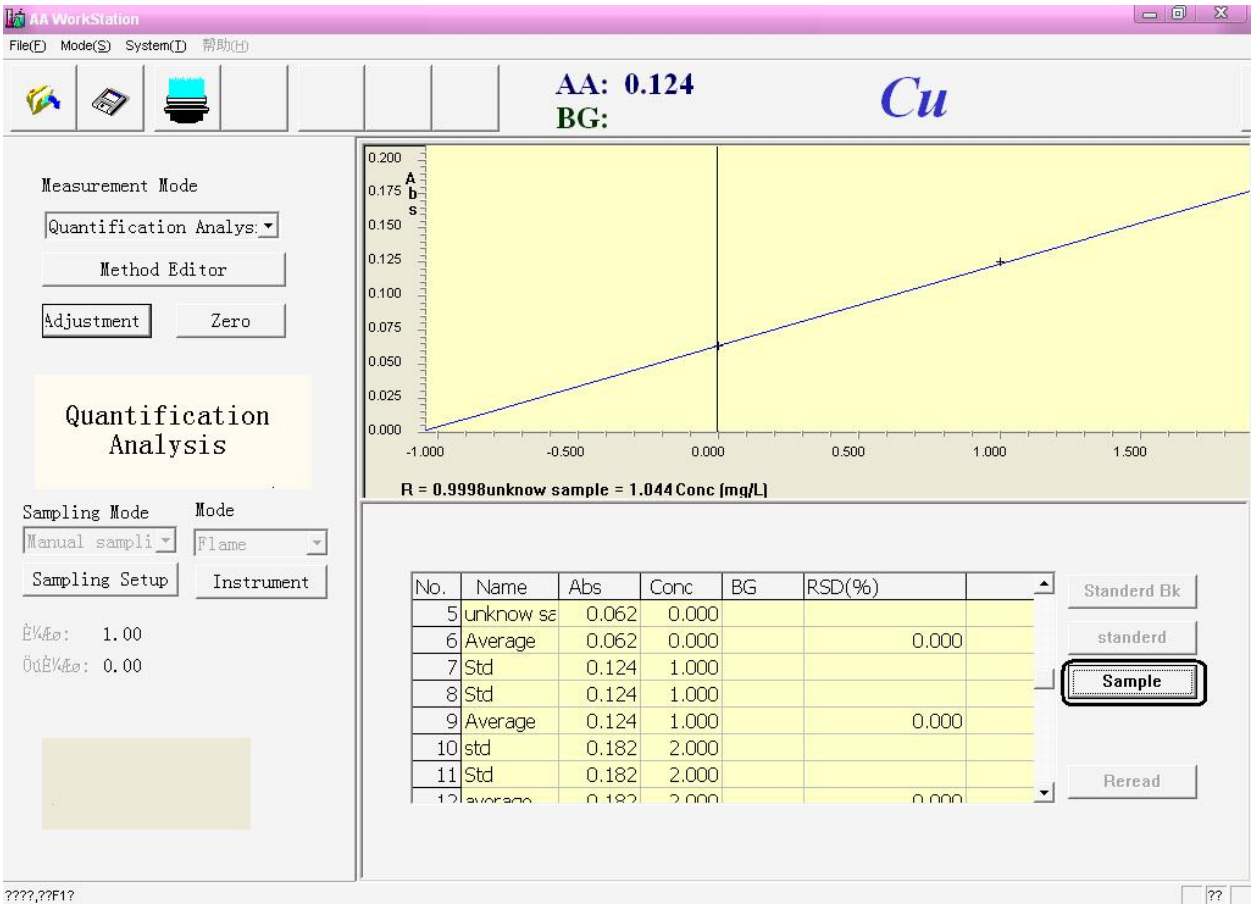


Figure 5-29

Method of Additions(Nonlinea)

Take Cu lamp 1 as an example

1. Aligning lamps.see" Aligning lamps"

2. Flaming the fire(see"Flaming")

3.Input the appropriate"Read Time" in the "Instrument Page",select appropriate "Reading Mode"

4. Figure 5-30, select the "quantification analysis" from the "Measurement Mode"

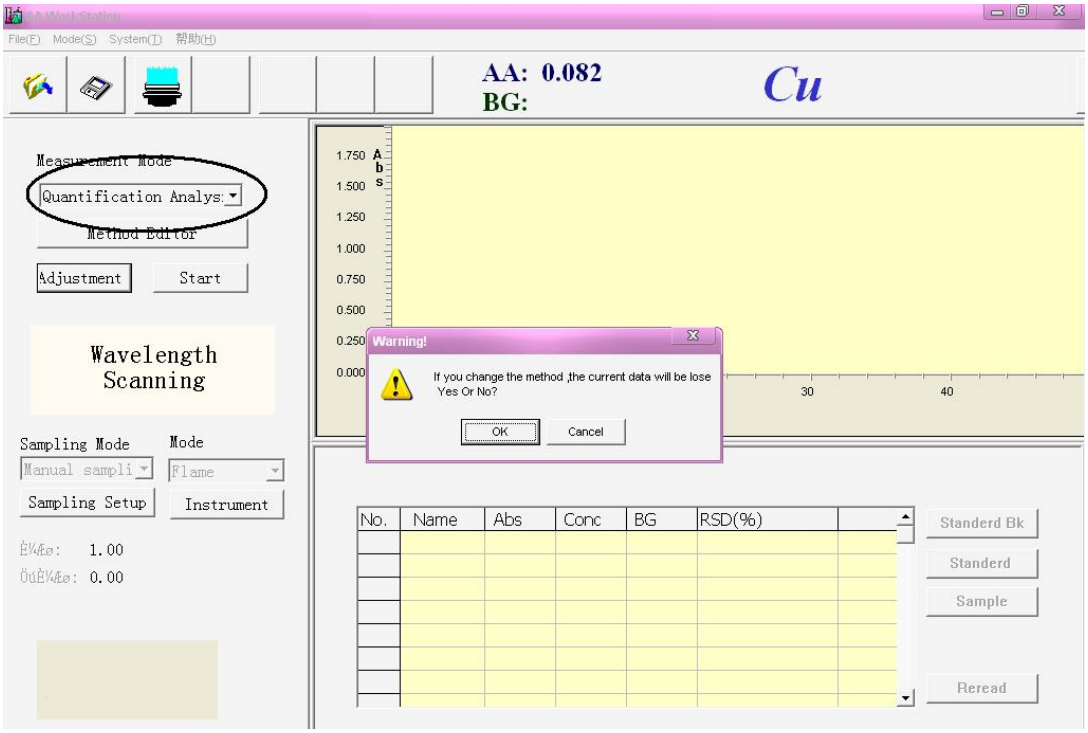


Figure 5-30

5. Press【OK】,open the “Calibration Dialoge”window.figure 5-31

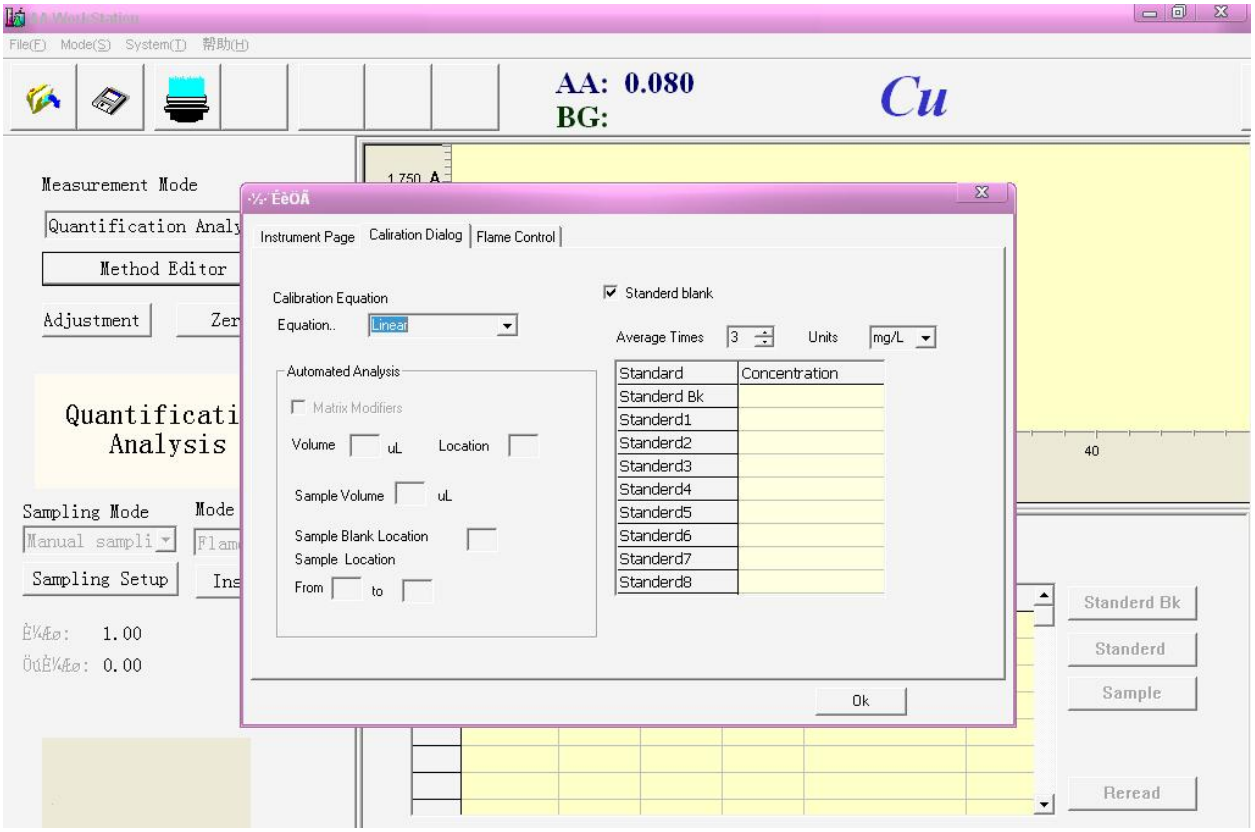


Figure 5-31

6.Select the “Meth.of Addition Nonlinear”in the “Calibration Equation”,figure 5-32

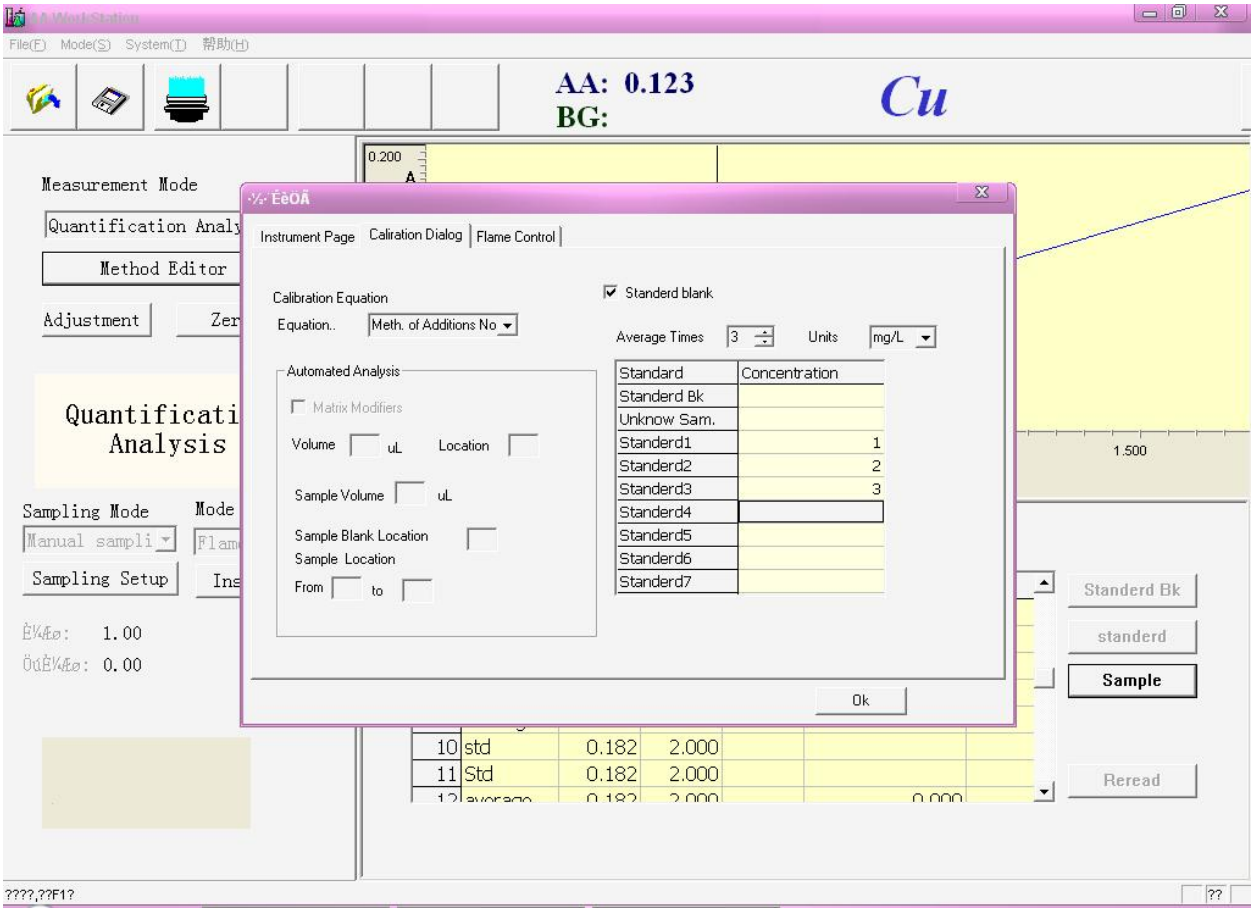


Figure 5-32

Notice: at least input 3 standard samples

7.Press【OK】button,close the dialog,"Standard Bk"brighten,figure 5-33

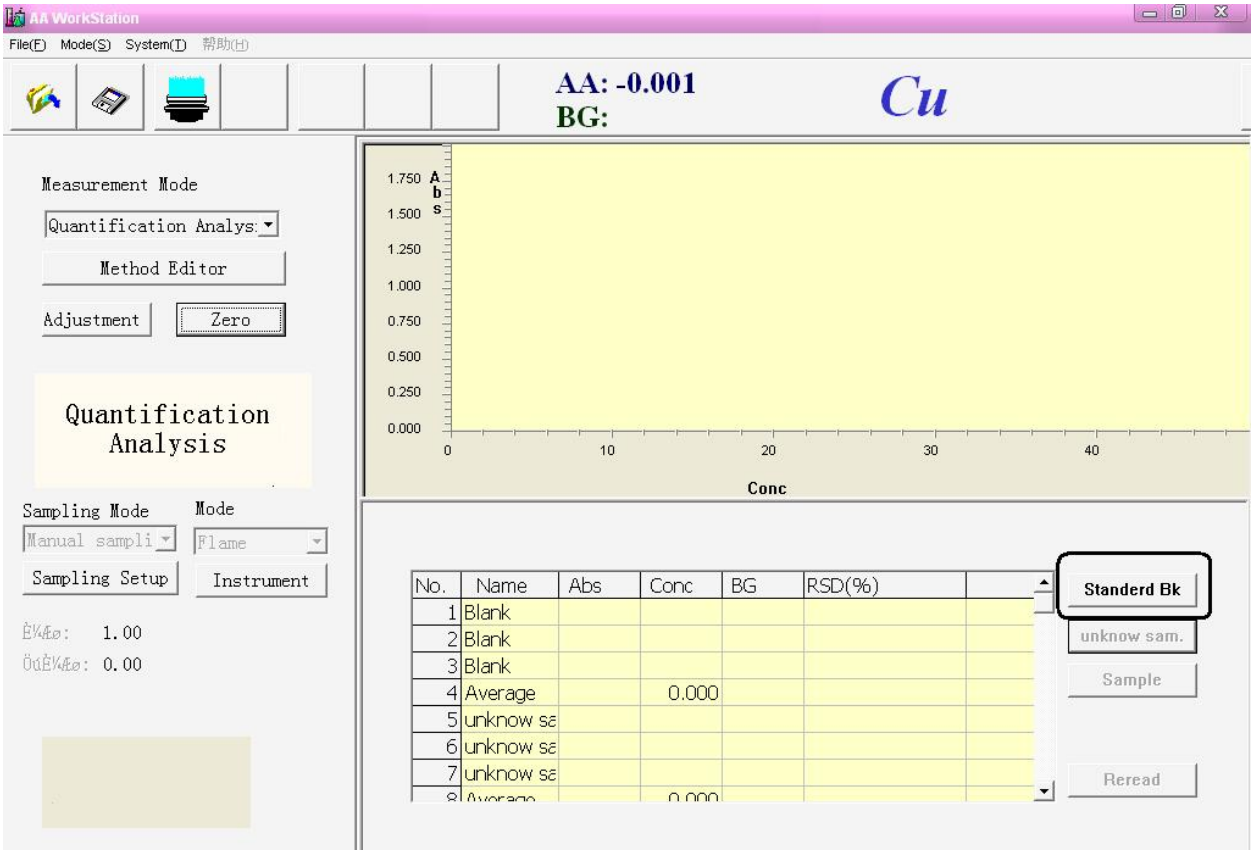


Figure 5-33

8. Start testing other samples,the method is the same as the “Method of Additions(Linear)”,

9.After the testing,display the figure 5-34

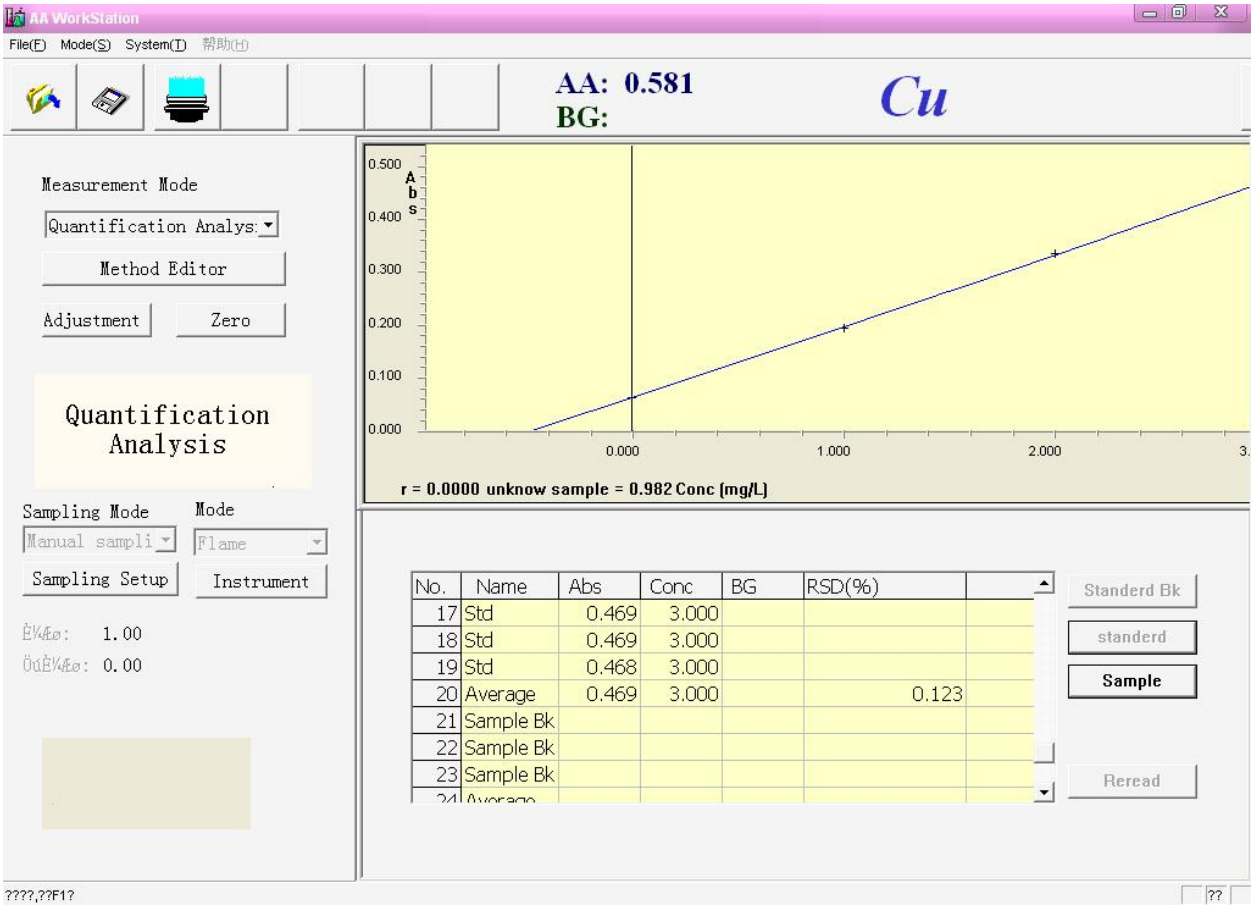


Figure 5-34

10. If you are not satisfied with the measurement result you can test again.

11. Start testing other samples

Rereading and changing the name of the sample

Rereading

If you are not satisfied with the data after testing the samples,you can test again.For example,if you are not satisfied with the result of sample 5,select it with the cursor,figure 5-40a

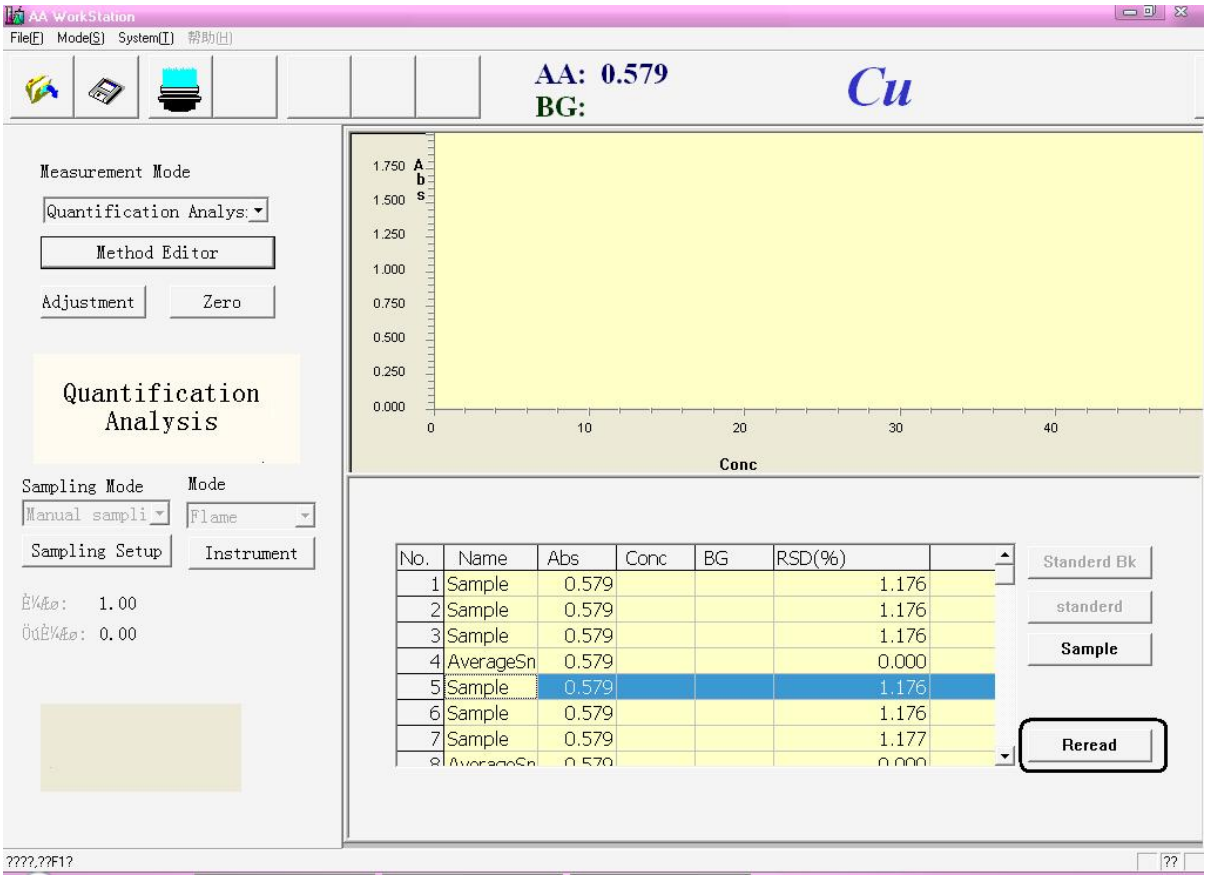


Figure 5-40a

2. Spurt and absorb the sample again,press【Reread】button,display the figure 5-40b

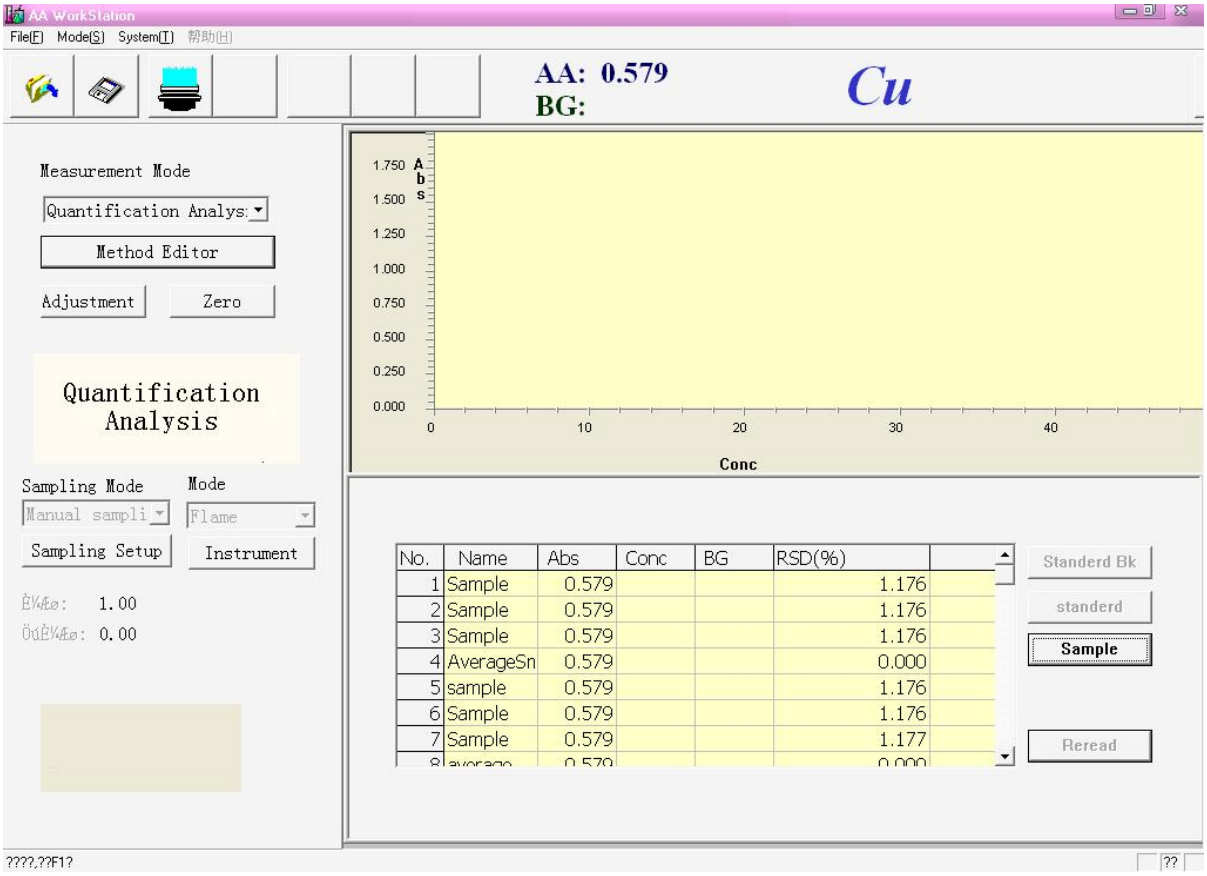


Figure 5-40b

Changing the Name of the samples

The name of the samples can be changed according to the user's requirements.For example,when you want

to change the sample's name of No.5 in the figure 5-40b,please click on the name twice ,display the figure Figure 5-41a,5-41b

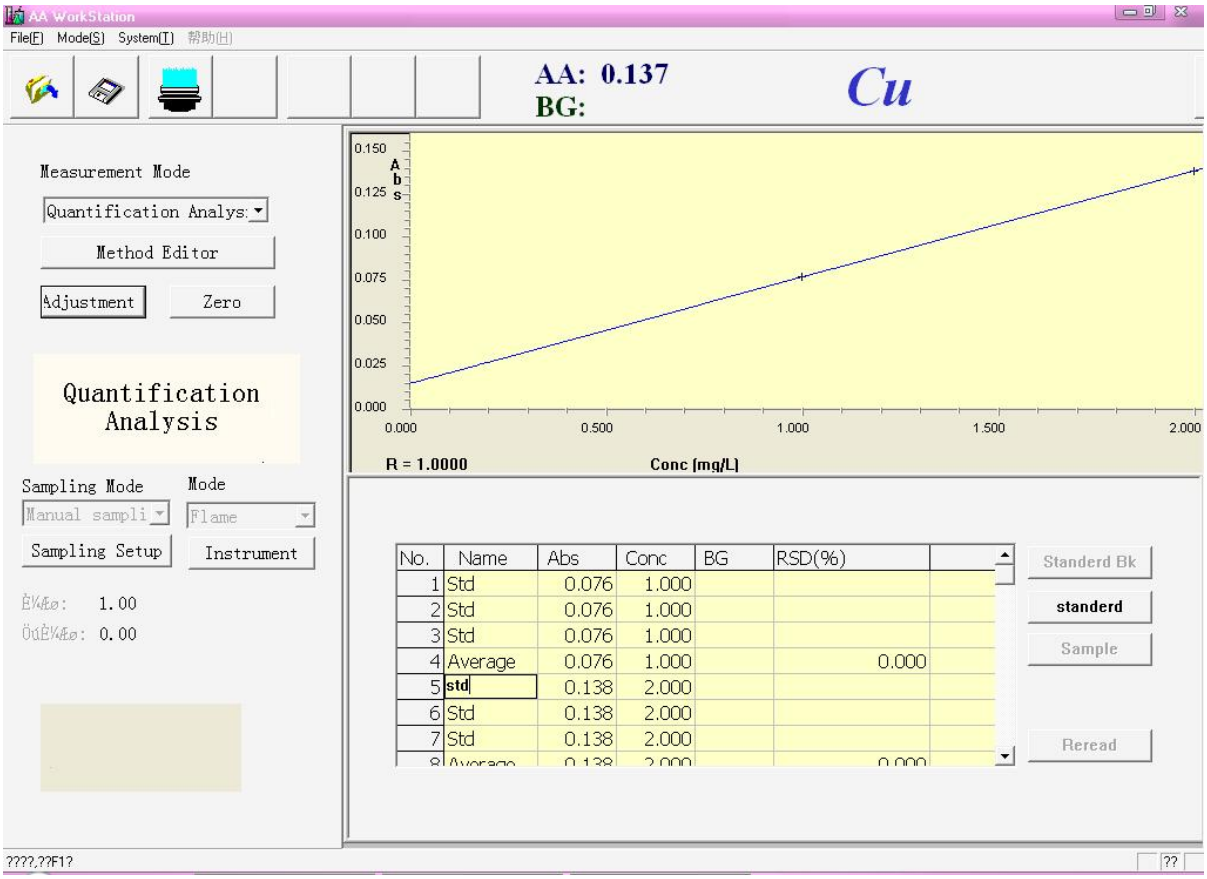


Figure 5-41a

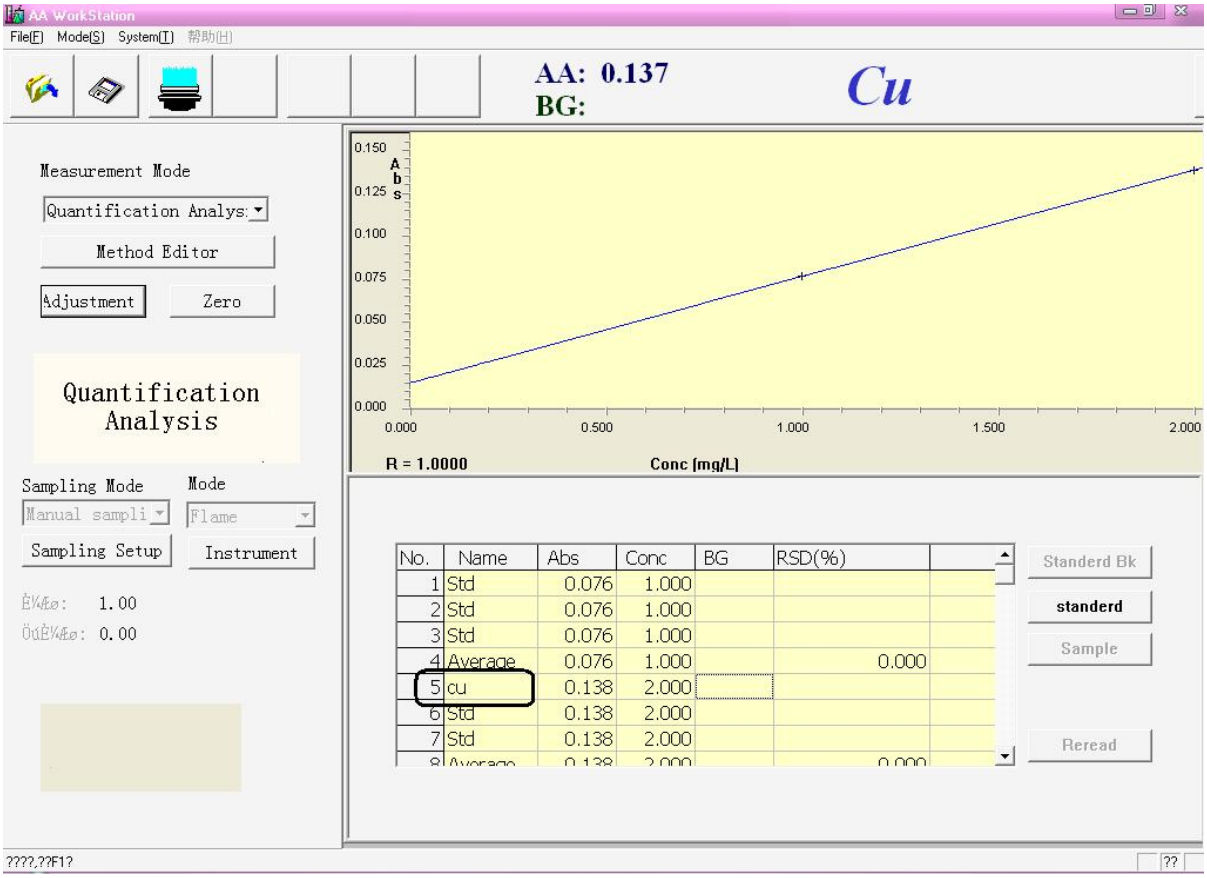


Figure 5-41b

Printing

After the measurement,the result can be printed.The operating method is the following:

Click on the Print/Quantification Analysis in the file menu,an shown in the figure 5-49,display the “sample information” dialog,as shown in the figure 5-50

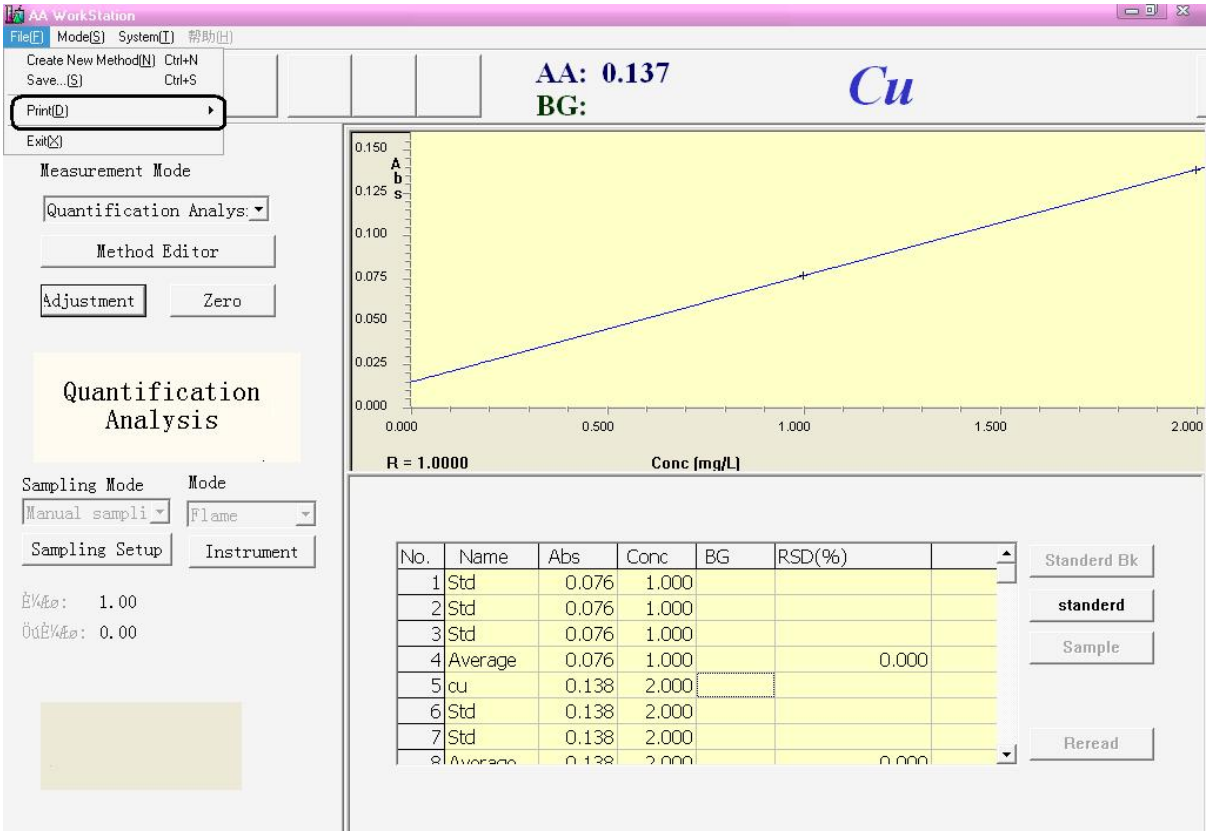


Figure 5-49

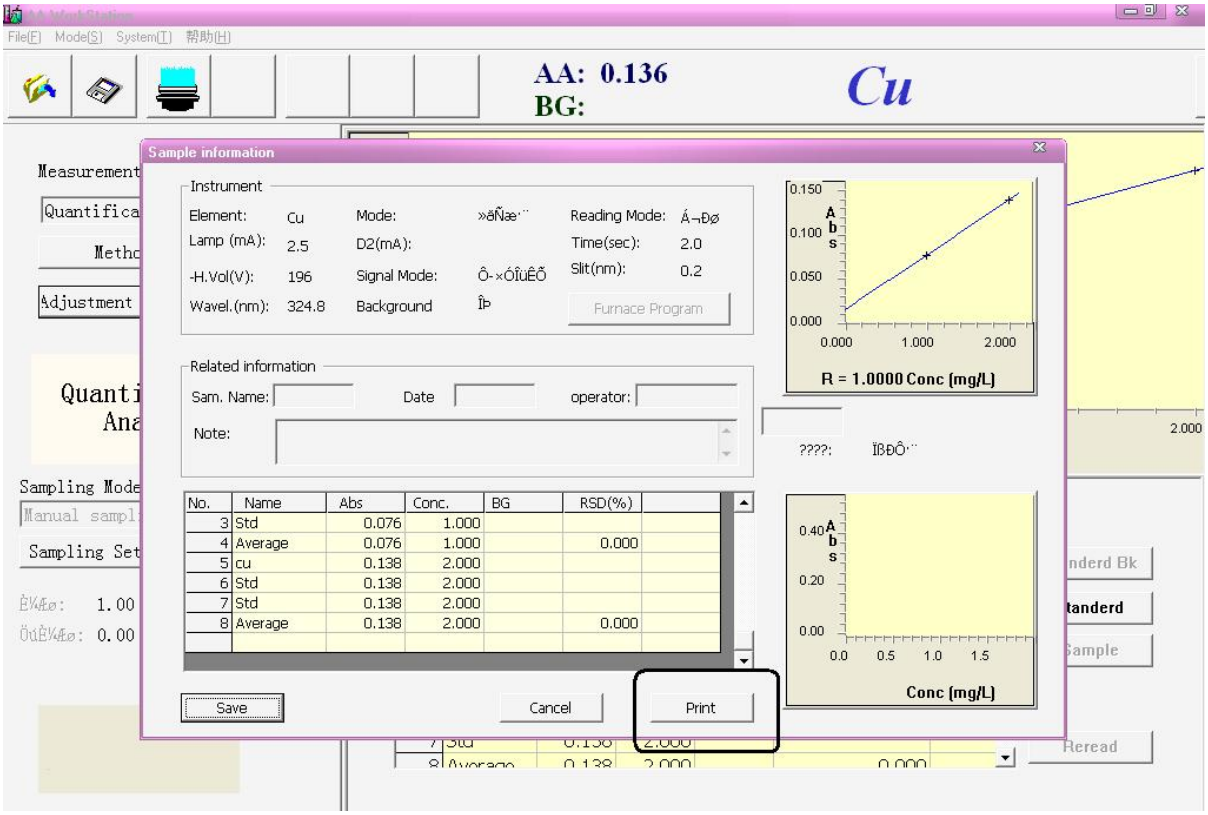


Figure 5-50

2.Press【Print】button,display the figure 5-51

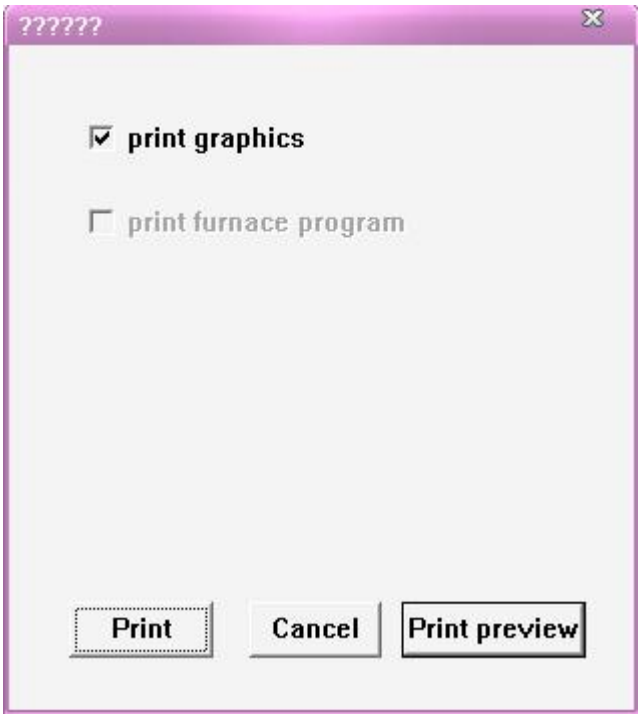


Figure 5-51

3.You can operate according to your need

Chapter 6 Background-Corrected AA

Background-Corrected AA

Take the lamp 1 as an example

1. Ignite the flame, see "Ignition Operation"
2. Select the "quantitative analysis"
3. Press”Adjustment”button,as shown in the figure 6-1

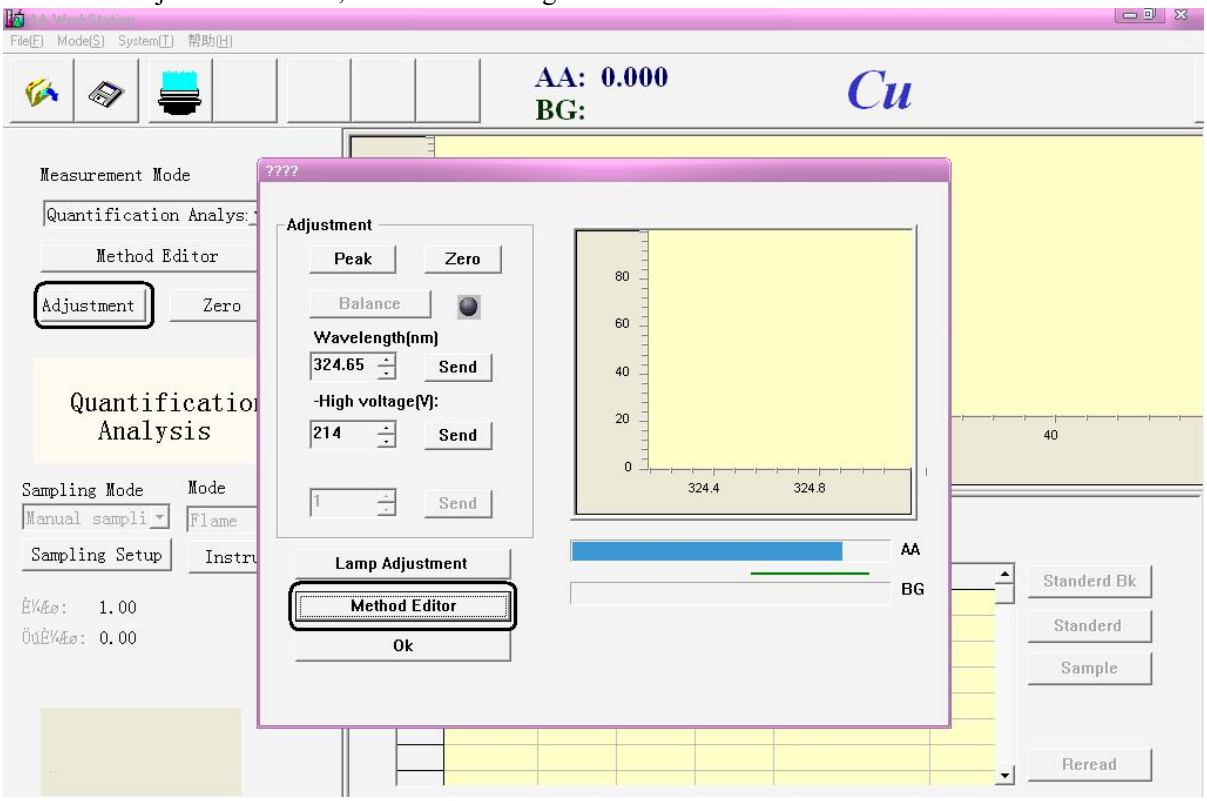


Figure 6-1

4.Press”Method Editor” in the”Adjustment” dialog,display the figure 6-2

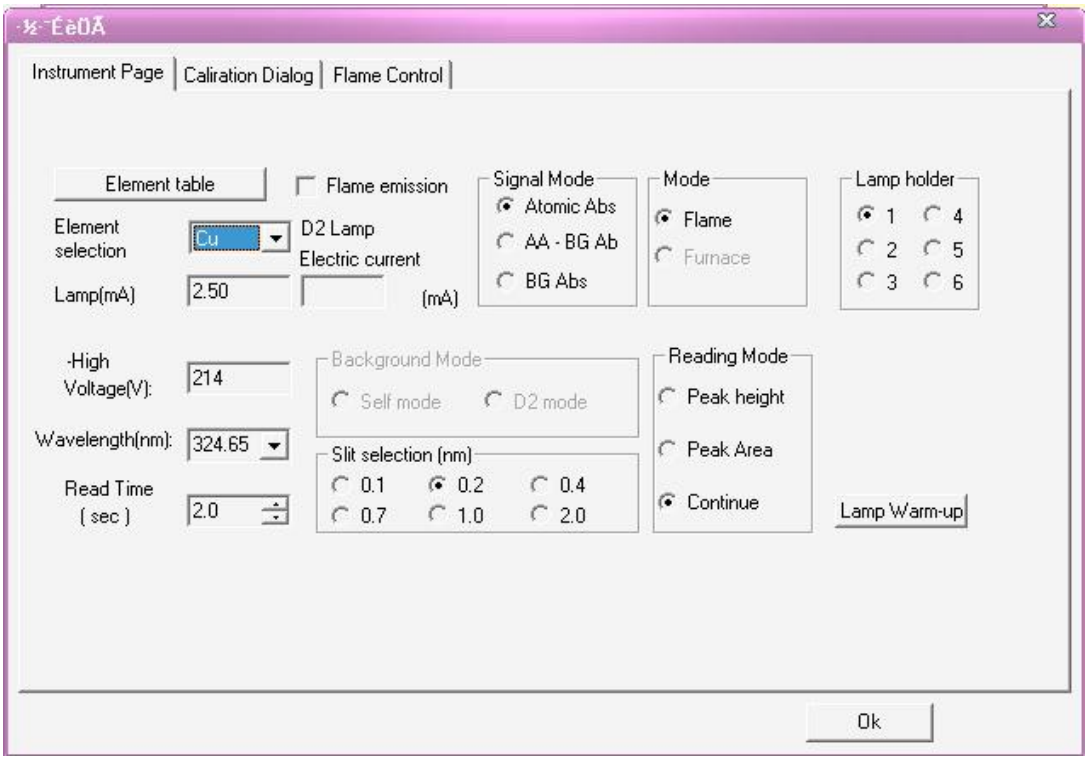


Figure 6-2

4. Select the element of Zn and the signal mode of “AA-BG AE”,the background mode is D2 mode,the corresponding parameter is shown in the figure 6-3

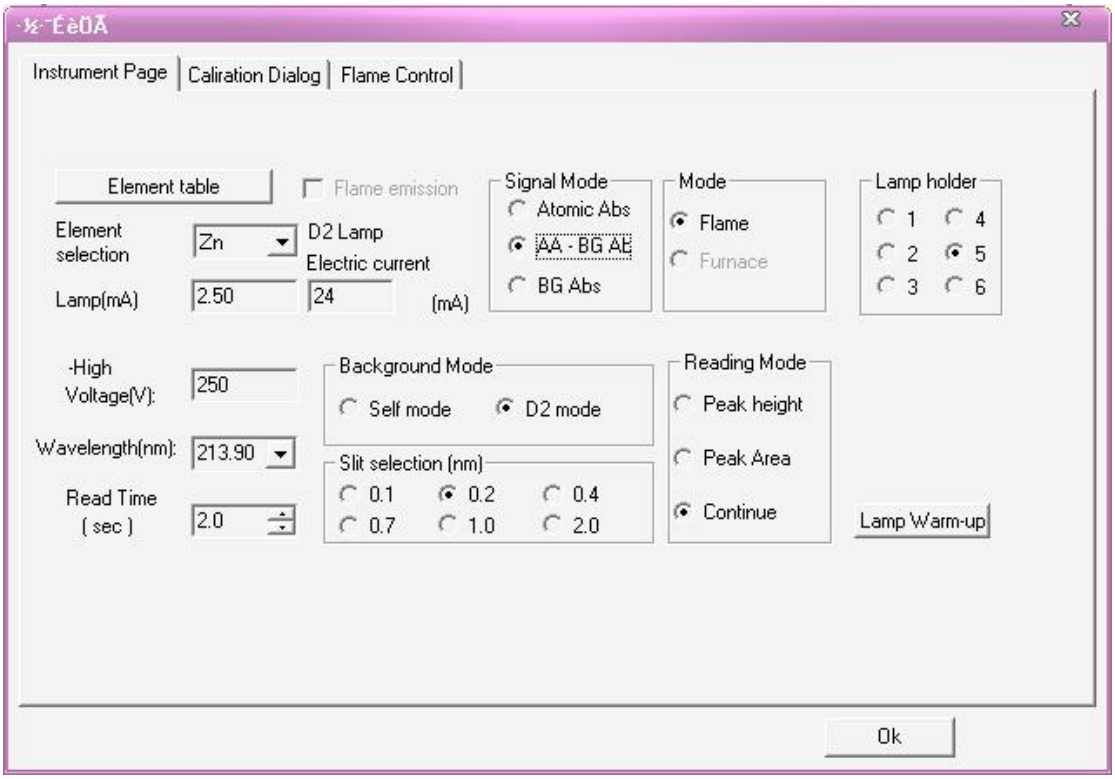


Figure 6-3

5.Press【OK】to align lamp,figure 6-4,see “Aligning lamps”

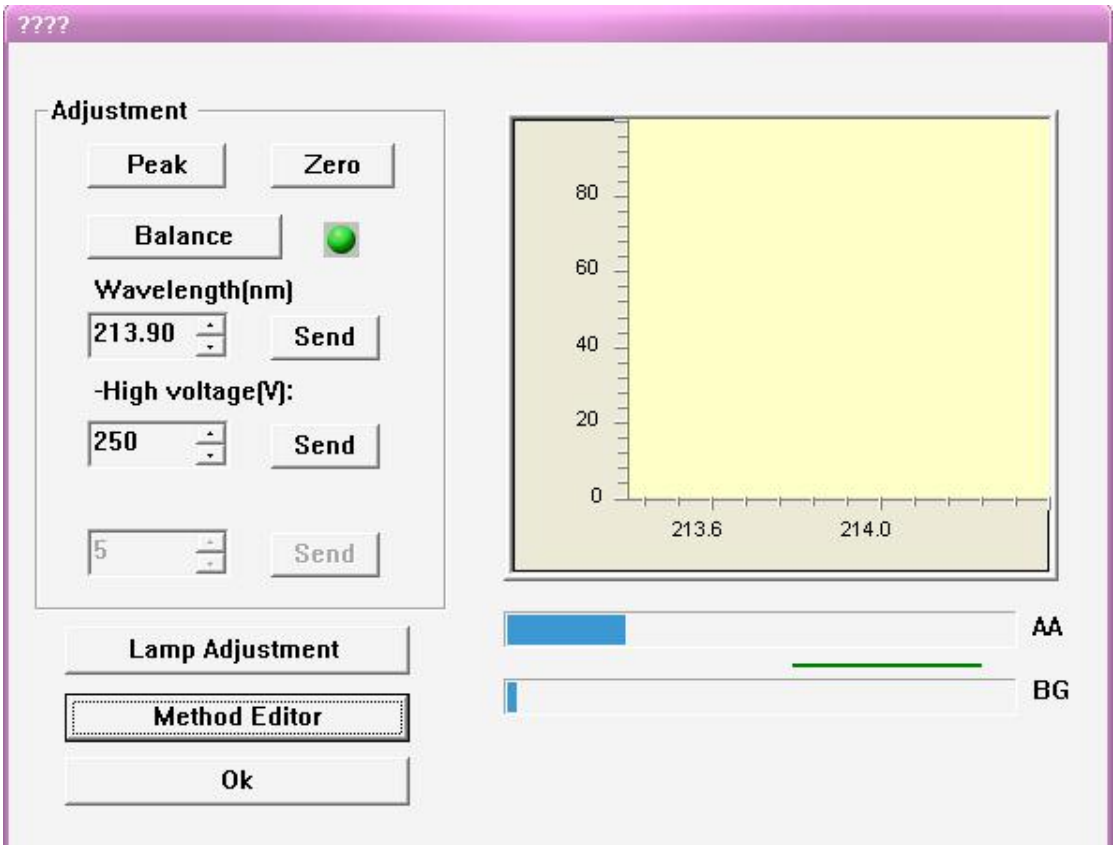


Figure 6-4

6.After this,press【Balance】to balance the D2 lamp and element lamp,figure 6-5

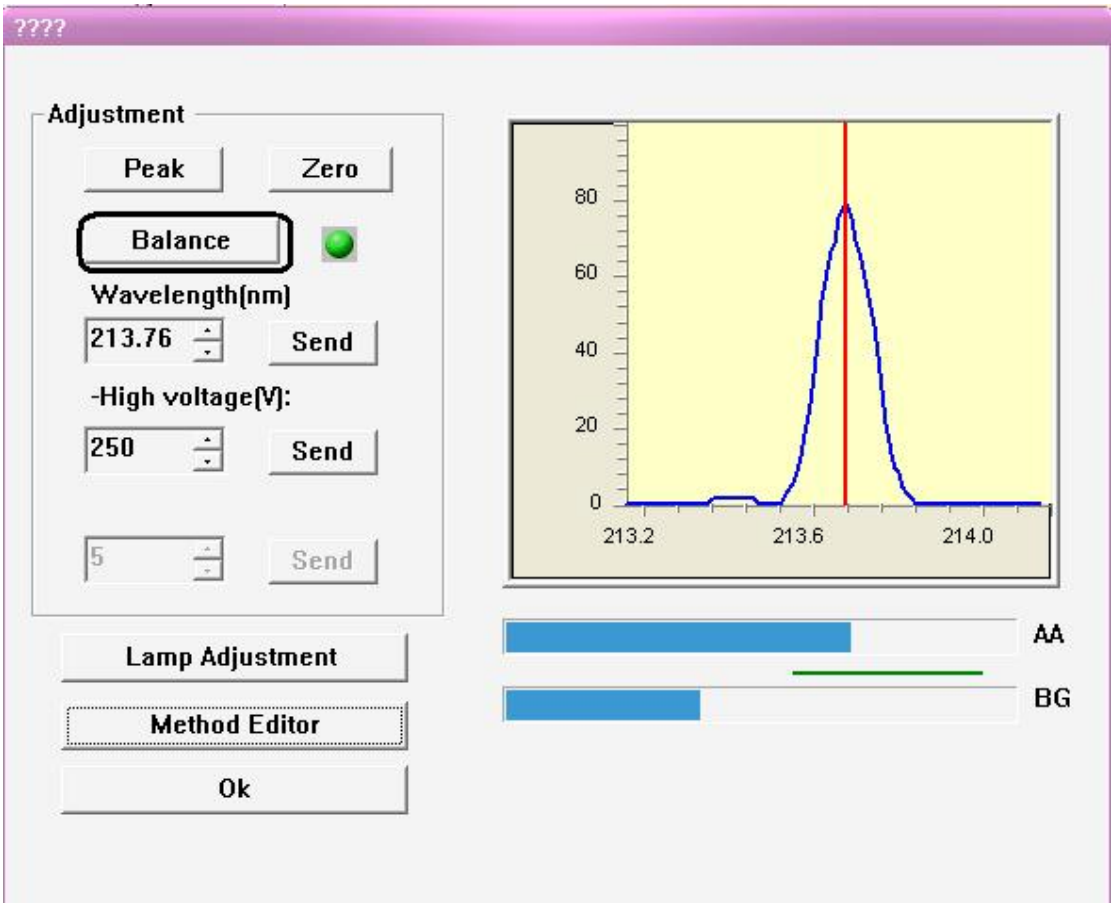


Figure 6-5

7.Press【Balance】button,display the figure 6-6

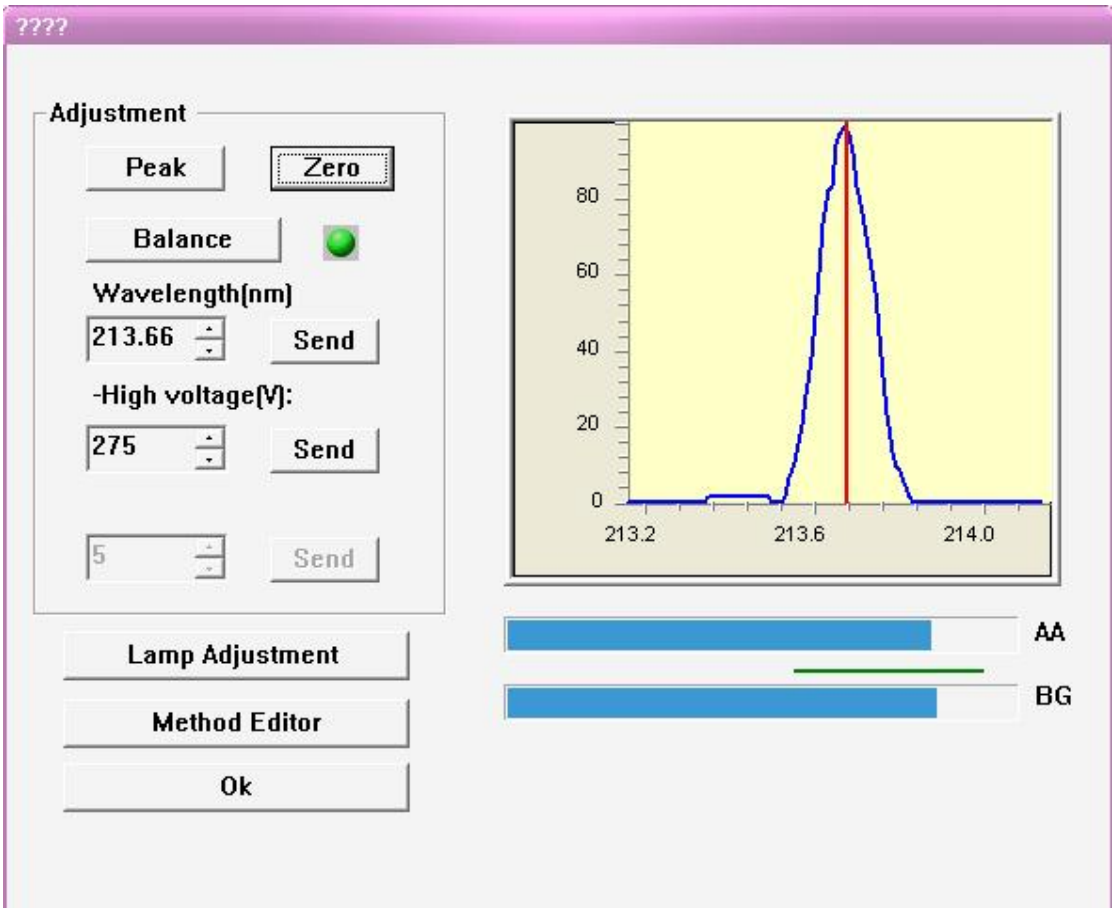


Figure 6-6

8.After this,press【OK】to close the dialog

9.Press 【 Method Editor 】 to open the “Calibration Dialog”window.select the “Linear”in the “Equation”,input corresponding information,figure 6-8

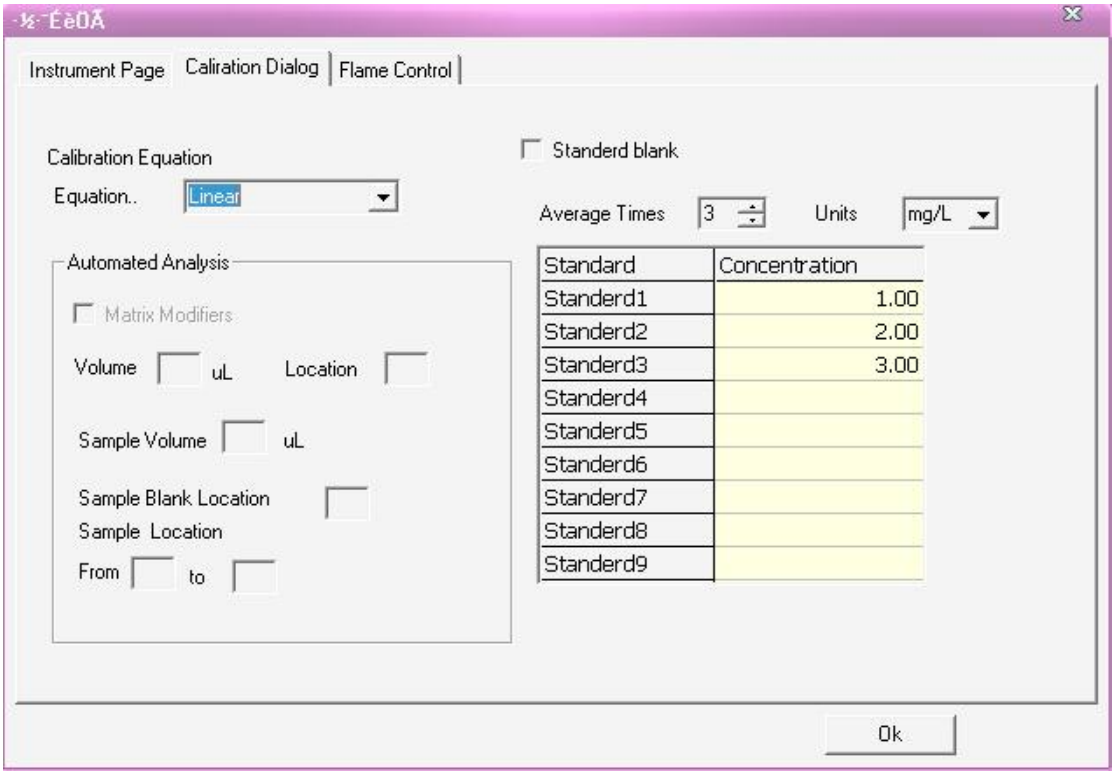


Figure 6-8

10.Press【Zero】,spurt and absorb the standard sample 1,press【Standard】,display the figure 6-9

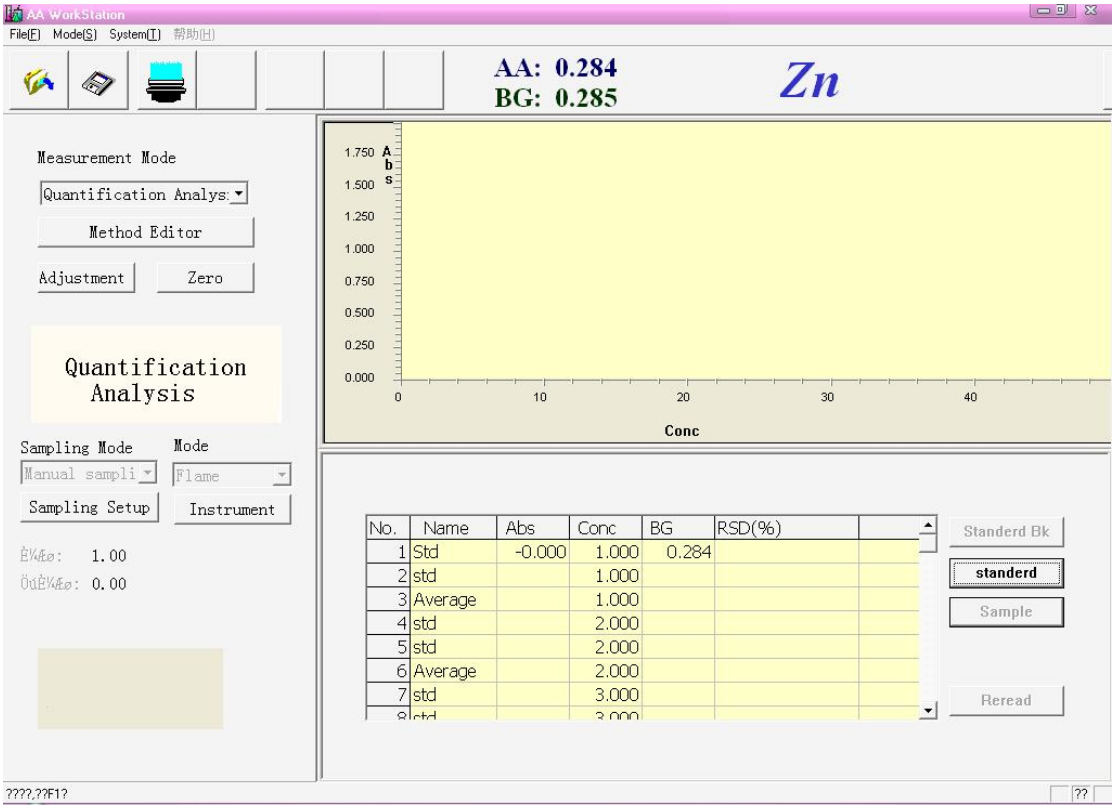


Figure 6-9

11. Spurt and absorb the standard sample 1 again,press【Standard】,display the figure 6-10

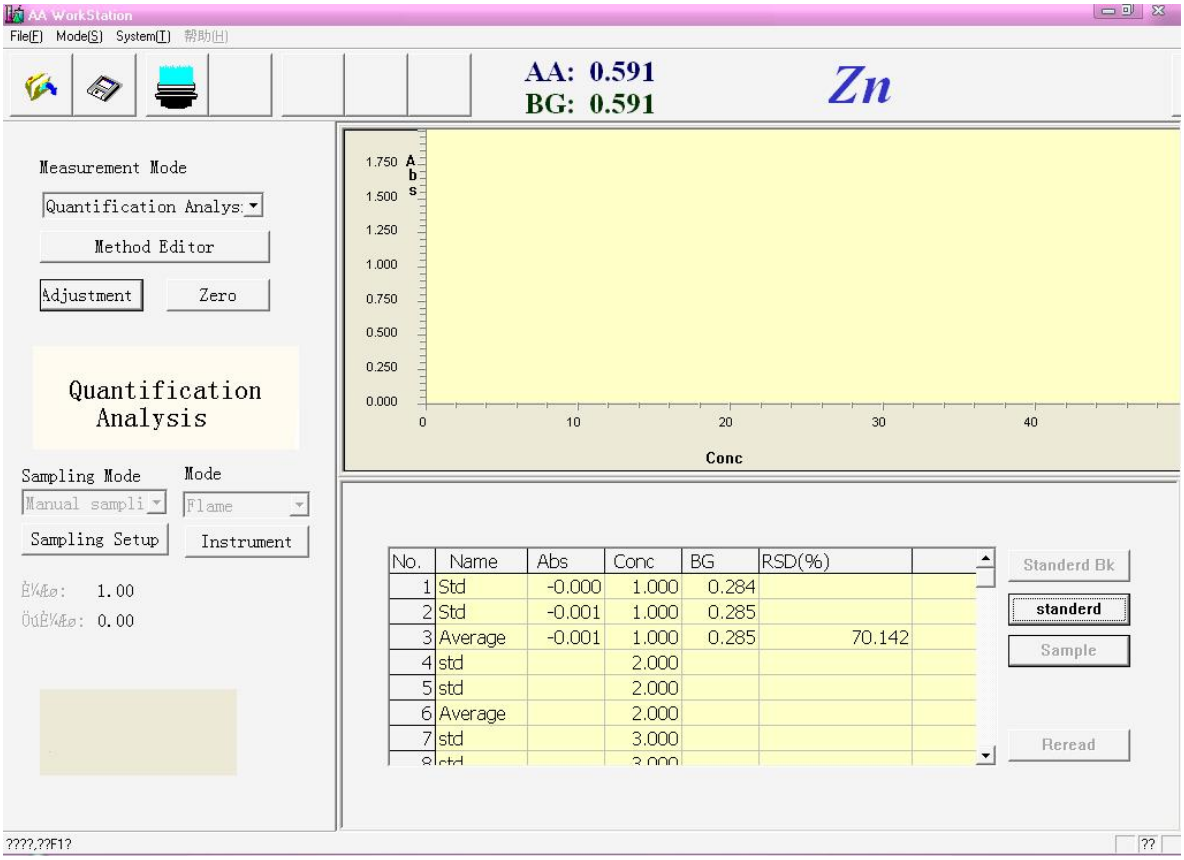


Figure 6-10

12.Measure the other two samples following the method.After this,display the figure 6-11

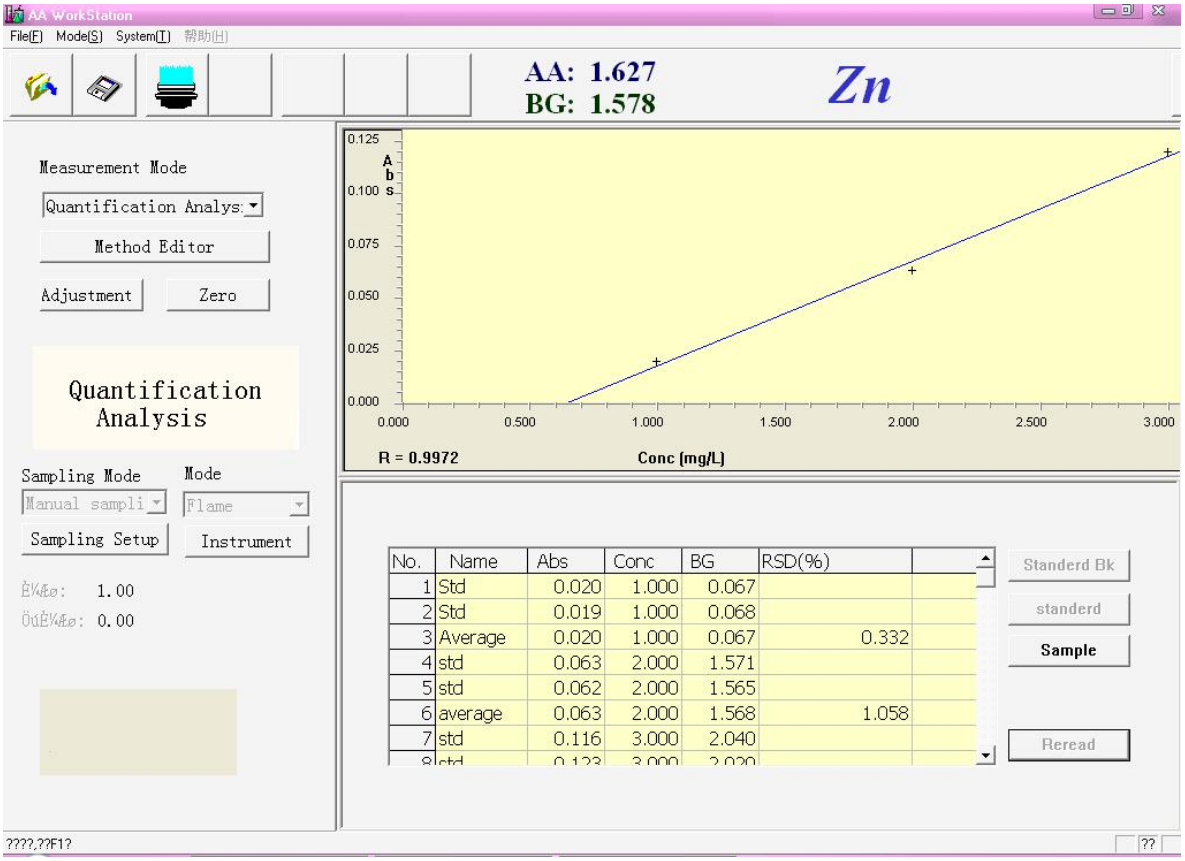


Figure 6-11

13.If you are not satisfied with the testing result you can test again.see the “Rereading the Sample”

14.Start to test other samples,the method is the same as this

Self Mode

NOTICE It is necessary for you to use the L-2433 high-intensive element lamp made in Japanese bingsong or other similar company.If you use the common element, performance of the lamp will decrease

Take the lamp 1 as an example

1. Ignite the flame, see "Ignition Operation"

2.Select the "quantitative analysis"

3.Press”Adjustment”button,as shown in the figure 6-12

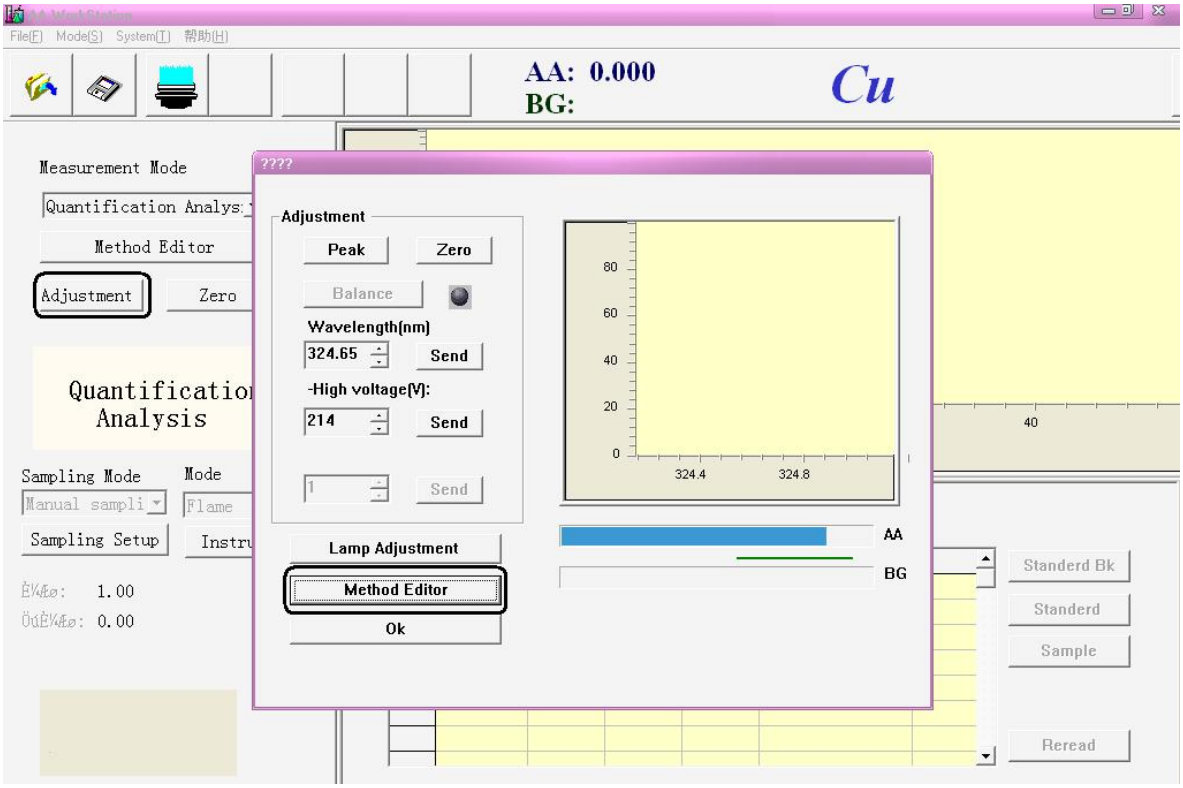


Figure 6-12

4.Press【Method Editor】in the "Adjustment"window,display the figure 6-13

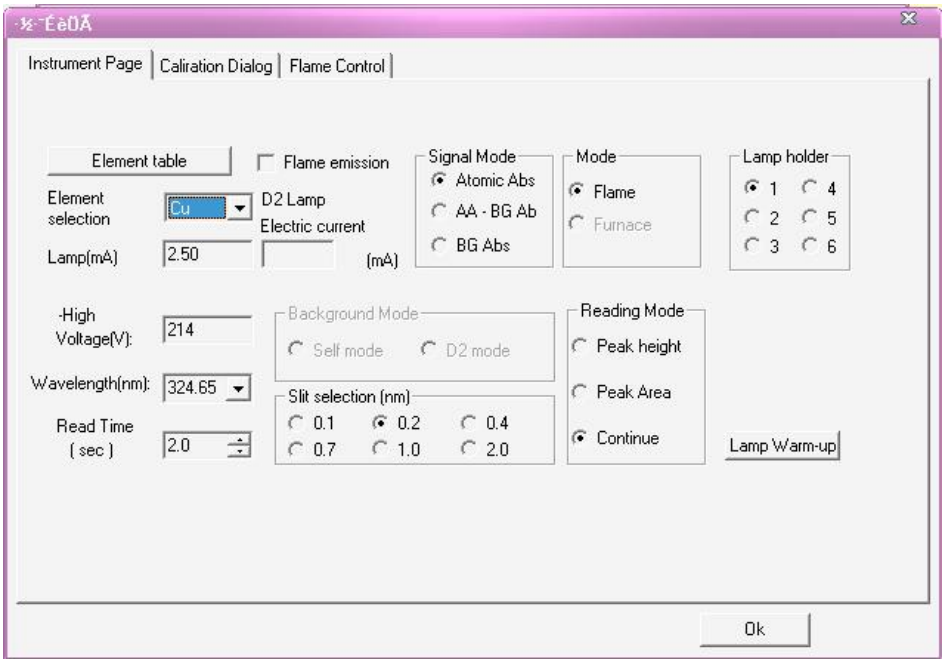


Figure 6-13

5. Select the element of Zn and the signal mode of "AA-BG AE",the background mode is self mode,the corresponding parameter is shown in the figure 6-14

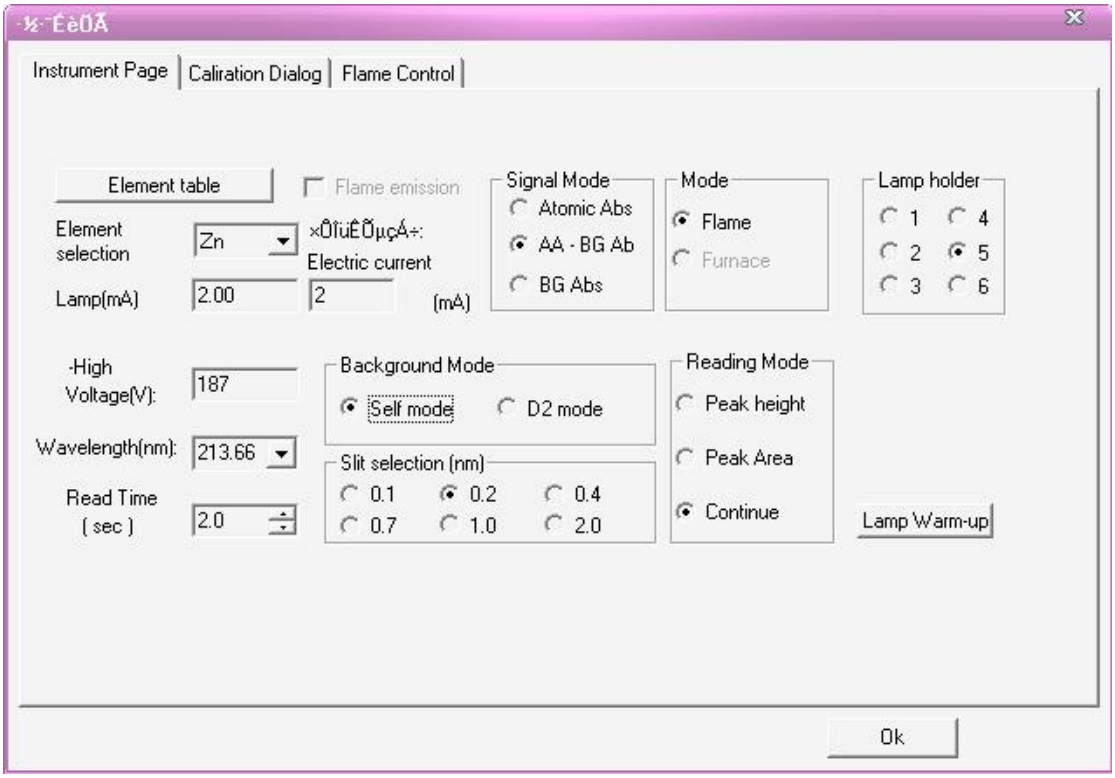


Figure 6-14

6. Press【OK】to align lamp,figure 6-15,see “Aligning lamps”

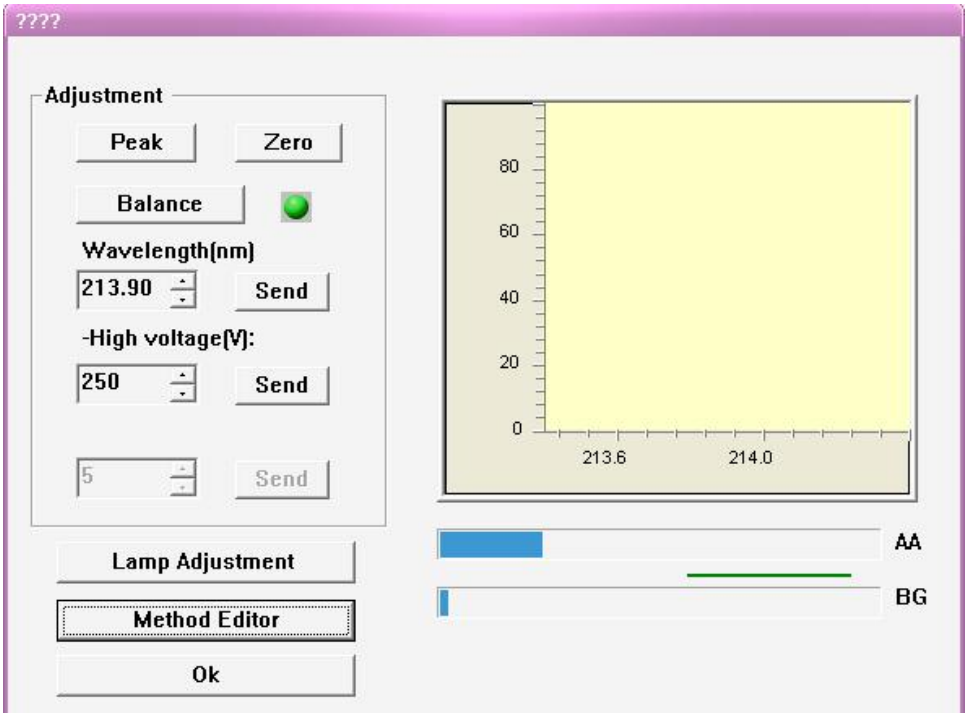


Figure 6-15

7. After this,press【Balance】to balance the D2 lamp and element lamp,figure 6-16

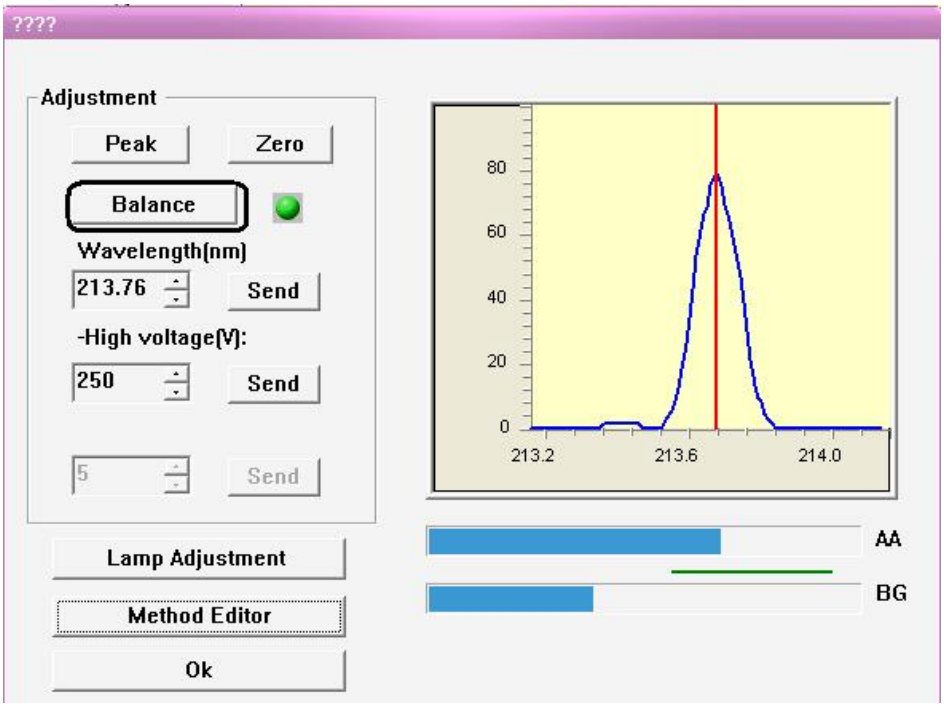


Figure 6-16

7. press【Balance】button ,display the figure 6-17

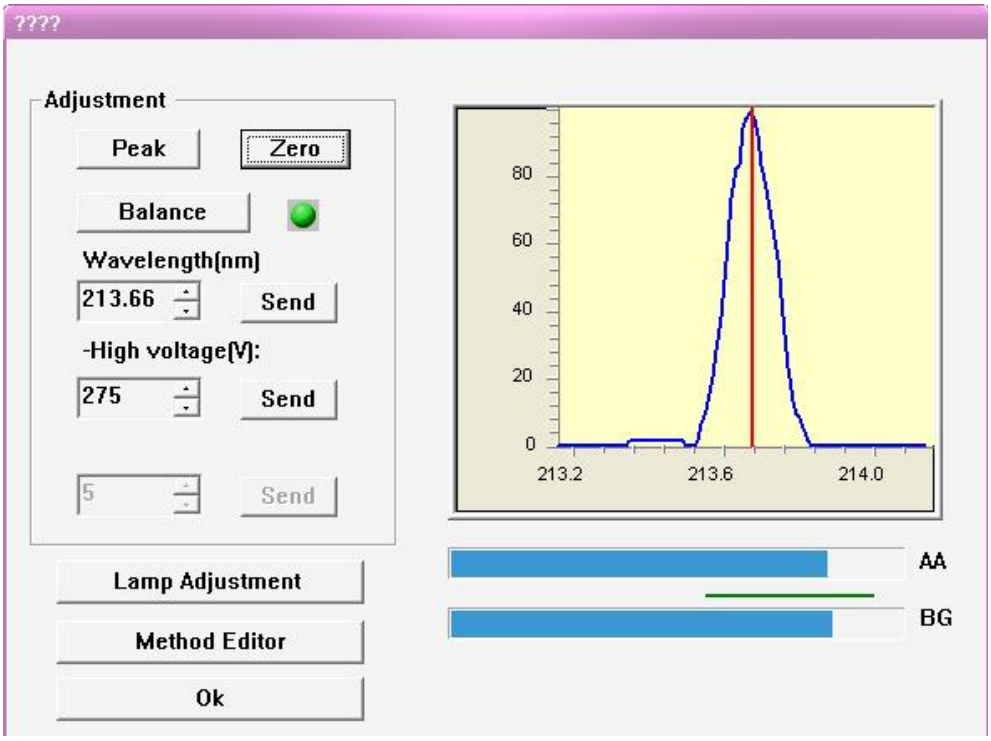


Figure 6-17

8.After the balancing,press【OK】button to close the window

9.Select the measurement mode requested by the user to test the sample