Huazheng®

HZ3000Y
Microcomputer Salt Content Analyzer

User Manual

Huazheng Electric Manufacturing (Baoding) Co., Ltd

Dear user:

Thank you for choosing HZ3000Y Microcomputer Salt Content Analyzer.

We hope that this instrument can make your work easier and more enjoyable, so that you can get the feeling of office automation in the test and analysis work.

Before using the instrument, please read this manual, and operate and maintain the instrument according to the manual to prolong its service life. "Just a light press, the test will be completed automatically" is the operating characteristics of this instrument.

If you are satisfied with this instrument, please tell your colleagues; if you are not satisfied with this instrument, please call (0312) 6775656 to tell you to serve you at all times-Baoding Huazheng Electric Manufacturing Co., Ltd., our company will definitely make you satisfied !

Contents

I.Introduction and use scope

HZ3000Y Microcomputer salt content analyzer using microcoulometry technology and use computer to control microcoulomb titrate. It's the newest product, has reliable performance, easy operation, stability, easy installation and so on. Suitable for the determination of the salt content of the oil chemical products. The instrument can also determine the salt content for heavy oil ,residuum,chemical products ,all kinds of industrial water and discharge water, at the same time also applies to the determination of inorganic chlorine ion in the various sample， sensitivity of 0.1ngNaCl/uL. The results accord with the requirement of international general method, it is the current electric desalting process control salt content of the ideal instrument。

HZ3000Y Microcomputer salt content analyzer based on Windows OS. The user-friendly interface makes analyses personnel operation is more convenient and fast. In the system analysis process, the operating conditions, analysis parameter and the analysis result directly showed on the monitor. According to need can save and print parameters and result in order to calling and archive in the future.

II.Working principle

HZ3000Y Microcomputer salt content analyzer composed by a computer, microcoulomb analyzer host, mixer, titration cell etc. Instruments working principle as shown in figure 1.

Crude oil is heated within polar solvent， use the water to extract the salt. After centrifugal separation，The extraction liquid injection titration with a syringe in the cell，Cl- in the sample reacts with Ag+ in the electrolyte cell：Cl- + Ag+ AgCl，

And make the Ag + concentration to reduce，measure –reference electrodecouple feel this change, and send the changes caused by the potential difference enters the Coulomb amplifier，the amplifier output a corresponding voltage is applied to the working electrode. Electrolytic anode consumption of Ag+ to complement Ag+. Measure the quantity of electricity of supplement consumption Ag +，according to the Faraday's law to calculate salt content of sample.

III.Technical indicators

Titration mode：coulometric titration

End point detection method ： Automatically determine the instrument through instruction-reference electrode

Display units：ngNaCl/ul

Detection sensitivity：0.1ngNaCl/ul

Measuring range：Salt Content：0.2～10000mgNaCl/ul

Titration cell capacity：145ml

Measure time：Less than 5 minutes per sample（Free sample handling）

Sample Volume：1g±0.2g

Power supply：AC 220V±20V，50HZ

Power：200W

IV.Composition and explanation

Instrument composed by a computer, microcoulomb analyzer host, mixer, sampler etc.

1、Micro-Coulomb Analyzer host

The host is a key component of signal amplification and data processing. The power light on top left of the front panel ,the back panel has the serial port, electrode socket ,power socket ,GND and power switch.

1、 Titration cell

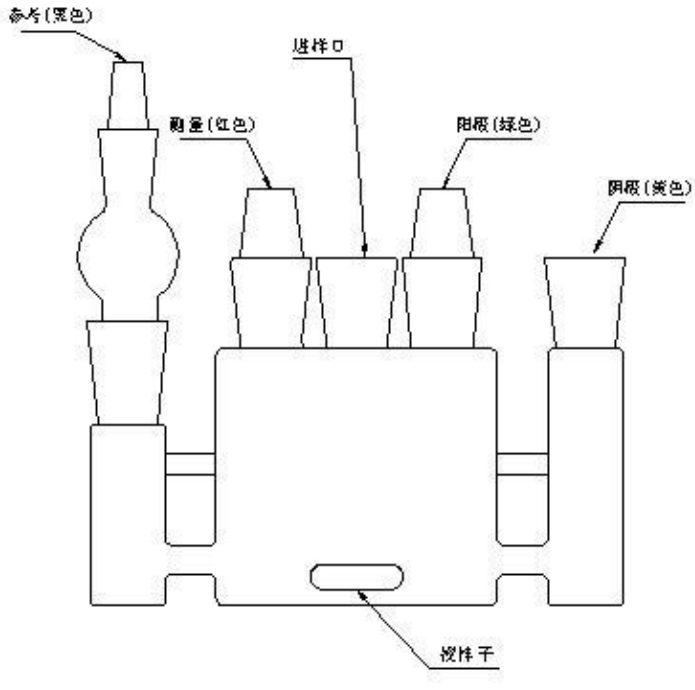

Figure 2 titration cell schematic

3、Agitator：

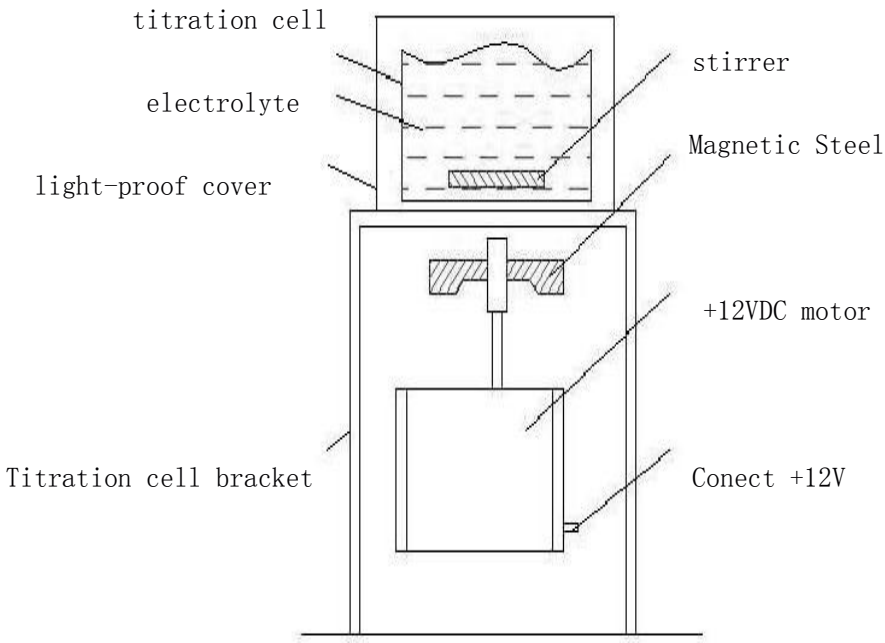

Figure 3 Agitator schematic

The product of the sample was injected into the titration cell with a micro injector，to ensure that its between the titrant electrolyte fast and full access，this work was done by magnetic stirrer. The operation principle of magnetic stirrer as shown in Figure 3. Agitator working on +12V DC voltage and the stir bar in the titration cell were uniform rotating with the magnetic steel so as to achieve the purpose of stirring the electrolyte. The rate should not be too fast or too slow and agitating to produce small vortex is appropriate. At the same time, the titration cell should be just above magnetic steel in order to avoid stirring rod collide electrolyze wall.

4、Centrifuge tube：

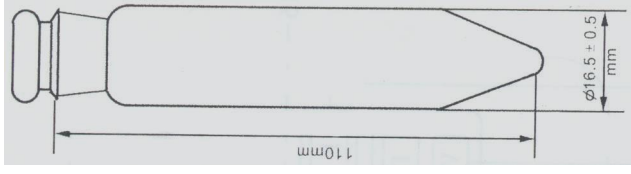

Figure 3 Centrifuge tube schematic

5 Water bath ，Room temp～100℃，automatic control±1℃，For heating the sample in a centrifuge tube。

6 Mixer，Used to mix the sample and solvent of the centrifuge tube。

7 Centrifuge，0～4000rpm adjustable，for Separation of Oil and Water。

V.Equipment installation and debugging

1. The environmental conditions for install instrument

（1）Work power: ac 220V±20V, frequency50Hz±0.5Hz。

（2）Environmental temperature: 0 -40 ℃, relative humidity: ≤85%。

（3）Instrument host don't pick up with high-power high-frequency equipment in the same power supply.

（4）Instrument installation to avoid strong corrosive gas place.

（5）Instrument installation to avoid strong electric field or magnetic field interference place.

（6）Instrument installation should avoid temperature change sharply or direct sunshine place.

2. Instrument installation of positive schemes

As shown in picture 5, put the printer and computer and other equipment components on a cleaning table in ordinal neatly.

Figure 5 instrument positive schemes

Instrument use AC 220V±20V and frequency 50Hz±0.5Hz power.

3 Schematic diagram of the instrument backpanel

Connecting the power line, electrode line, computer serial port cable and temperature control cables correspondently.Instrument cabinet must pick up to the earth and the grounding resistance less than 5Ω.

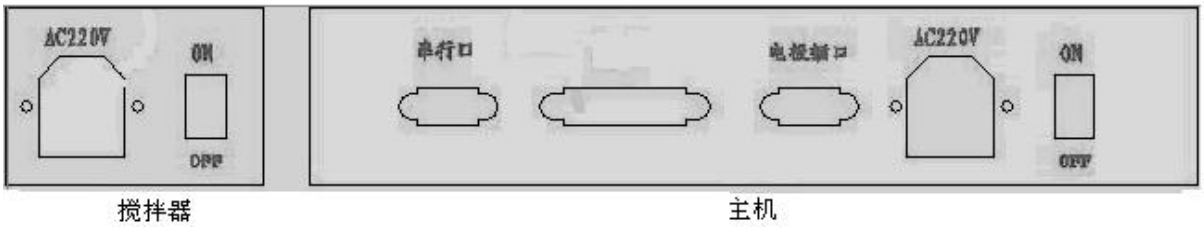

Figure 6 Schematic diagram of the instrument backpanel

4 Preparation work

Reagents used in the experimental analysis of NOS were pure, water is deionized water. Preparing the electrolyte：Take 700 ml glacial acetic acid，300ml deionized water into a 1L brown with narrow - necked bottles and mixed to standby.

VI.Method of operation

Open analyzer host, computer, mixer, sampler power in turn.

Put the prepared titration cell on agitator inside platform. Modifying the positions of electrolytic cell, making stirring rotation stability, and put light-proof cover on the titration cell. The small square hole on light-proof cover was used to observe the mixing is running smoothly and whether the sample injection titration cell.

connected the instrument reference (black), measured (red), anode (green), the cathode (yellow) electrode to the electrolytic cell head according the rule. (Don’t connected error!), and tighten to assure good contact.

1 Online operation：

Open the utility software of “HZ3000” in “WindowsXP”, shows its main form. Main form have menu bar, toolbars and etc, shown in figure 7. Click icon “on-line”, main form show “on line state” after normal connection, or re-check the ports and connections according from screen.

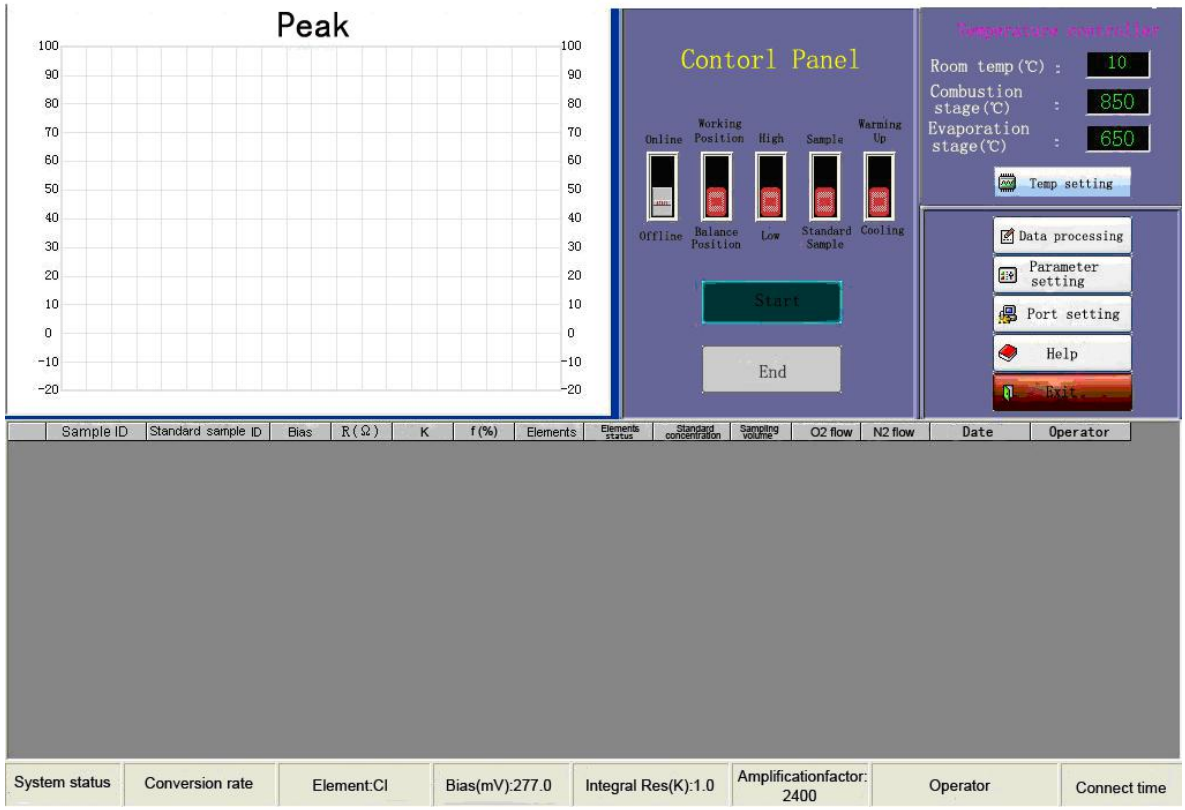

Figure 7 Main form

2.Test bias：

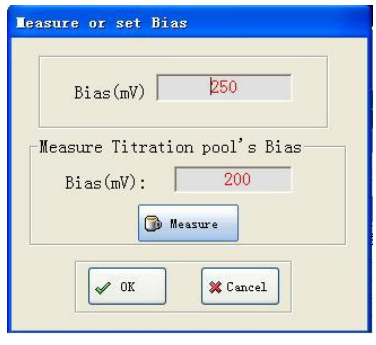

Figure 8 “Bias collect and setting” dialogbox

Flush electrolysis cell 2 ~ 3 times with fresh electrolyte. Connect the electrolysis cell and the host then collect electrolysis cell bias. Click “Bias” in toolbars then popup “Bias collection and settings” dialogbox as show in figure 8. Click “Start collect” button and

the instrument automatic to collect. When the bias stability, click “OK” button to complete the collection. General after flush electrolysis cell with fresh electrolyte the bias should be above 260mV.

3.Modify bias：

Click “Analysis control” in menu and point to "working position" then click it. At this time, if you want to modify electrolysis cell bias click icon “V” and popup a dialogbox like figure 8 then delete the original value and input to needed value, click “OK” button. At this time, baseline position will change, after a period of time, the baseline returned to the original position.

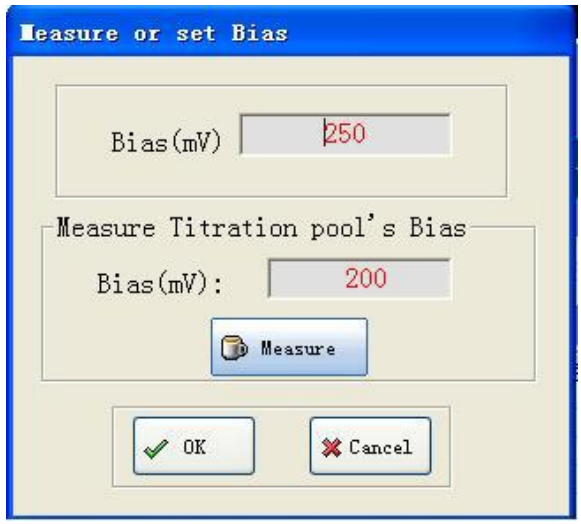

Figure 9“Bias collect and setting” dialogbox

4.Choose working parameters：

To analyze 10 mg/L liquid sulfur prototype for example, click figure 13” Parameter Settings “ and popup the dialogbox as show in figure 10. Click “liquid” in “choice for elements states” automatically chooses “mg/L” in”choice for content units” and chooses “Salt” in “choice for analyzed element” then click “OK” button.

In the Main Form control panel, select " standard sample / sample " box, switch to the " standard sample”；“ High / low "box in the switch to" low”（ High or low salt content, is usually higher than 1000 ng/uL, select " high " file）. “Design of the final judgment”， General Recommendation is 10, appropriately placed low at low levels, 3-6 ; you can choose 16-20 when trailing.

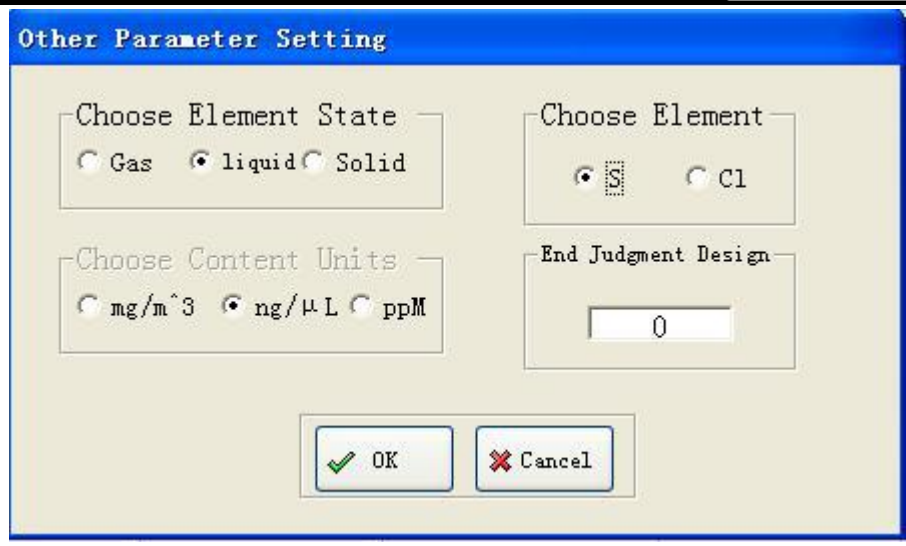

Figure 10 “Parameter Settings” dialogbox

5.Choose amplification factor and integral resistance：

Click “amplification factor” (below the main form) and set as 2400 in popup dialogbox as show in figure 11.

Like above steps to finish the integrating resistor setting. General, analysis salt content less than 1 mg/L, the integrating resistor choose 10k. Salt is more than 10 mg/L, choose integrating resistor 2kΩ or less.

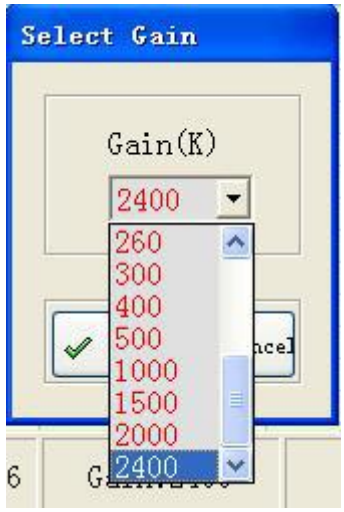

Figure 11 “Amplification factor choice” dialogbox

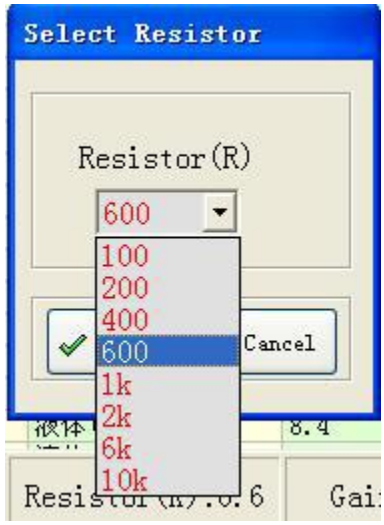

Figure 12 “Integrating resistor choice” dialogbox

6.Standard sample analysis：

When completed the above steps can be use the standard samples to analysis for transformation system. When baseline smoothly clicks “Start” button and popup figure 17. Click the blanks and input required value then click “Injection” icon. After peak, automatic shows conversion rate and serial number (f1, f2), click “start” button continue inject samples for continuous analysis as show in figure 18. Click the “End integral” if the peak is too small or large tailing to forced to stop data integral.

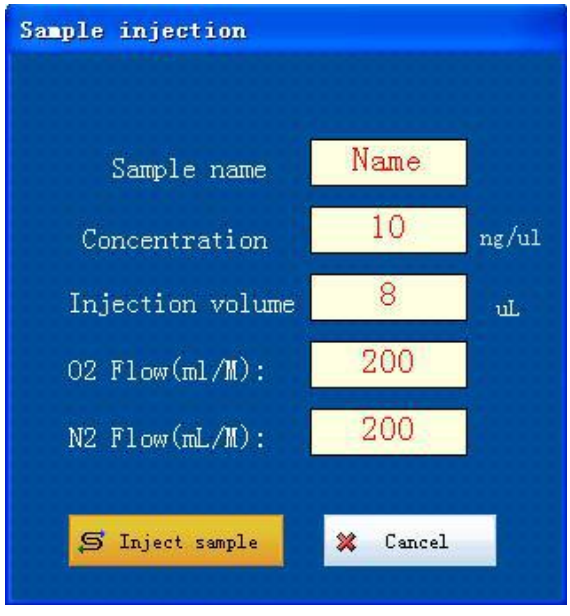

Figure 13

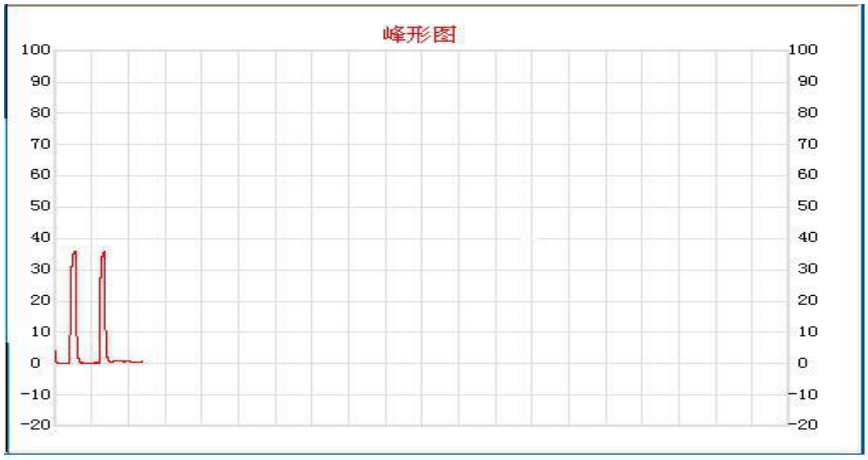

Figure 14

7．Calculating the average conversion rate:

Double-click the sample data and double-click several times you can get a number of standard samples' average conversion, display below main form.

8．Sample analysis：

The average conversion rate is completed, the sample can be analyzed. select the "sample" in control panel on the main form. Put in “Sample name” “injection volume”in figure 13. Insert a long injection needle into the bottom of the reservoir and inject the air 1~2 times with a 0.25ml syringe. Discharge the oil into the needle, then draw a small amount of liquid extraction. Flush syringes and injection with injection needles 2~3 times. Refer to table 1 data, extract the appropriate amount of sample press "start" button, then press "enter" through the cell of the titration cell, instrument that automatically start the titration. To the end, the instrument automatically stops integral. The other steps are the same as the above analysis.

After the continuous analysis of 2 to 6 times (such as "X1", "x2" and so on) after the end of the sample analysis, the data will be automatically saved, and the average content of the sample is calculated.

Table 1

Estimate the salt content ng/uL	Sample Volume ul

<10	500~100
10~100	100~10
100~1000	10~5
>1000	<5

Note 1：For water sample etc，can be directly inject into the titration cell with a syringe。

Note 2：If the sulfide in water with high water content，take 2ml water sample in a centrifuge tube，heating in a water bath at 70℃ for 1 minutes，then add 1 drops of 30%H2O2，After vigorous mixing, until after the water down to room temperature were analyzed.

9．Sample Handling：

⑴Heat crude oil to 50~70℃ and causes it to melt, then shake the sample bottle, causing the oil to sample the mixture thoroughly。If the bottle is too large, should not be heated or shaking，put the oil sample into the cup and heating and melting. The violent mixing make samples even with a glass rod, make samples even, a nd quickly take about 1 grams of oil in the centrifugal tube, add 1.5ml Xylene，2.0ml alcohol-water solution。

⑵Put the centrifuge tubes into the water bath, heating for 1 minutes, use rapid mixer mixing for 1 minutes after take out and heating 1 minutes and the mixing 1 minutes . Put it into centrifuge, centrifuge for 1-2 minutes in 2000~3000rpm speed. Make the oil / water separation as the obvious two phase, then carry out the analysis and test

Note 1：If the separation is not clear or turbid water. Repeat the above heating - mixing - centrifugal process，make it clear separation。If oil - water separation, but water is not clear，this does not affect the analysis results, can be analyzed as usual。

Note 2：If sulfide content in the sample is too high,add 1 drops of 30%H2O2, to eliminate interference.

10 Data processing:

Click figure 7 “Data processing” and popup “Data processing management” dialogbox. You can find the samples’ number, time and so on. If you need preview/print sample data and samples average contents, click select corresponding menu. When selected one or more must input the range query and then you can query / update, preview / print. If you need to delete data, select the data and deleted it directly.As show in figure 15.

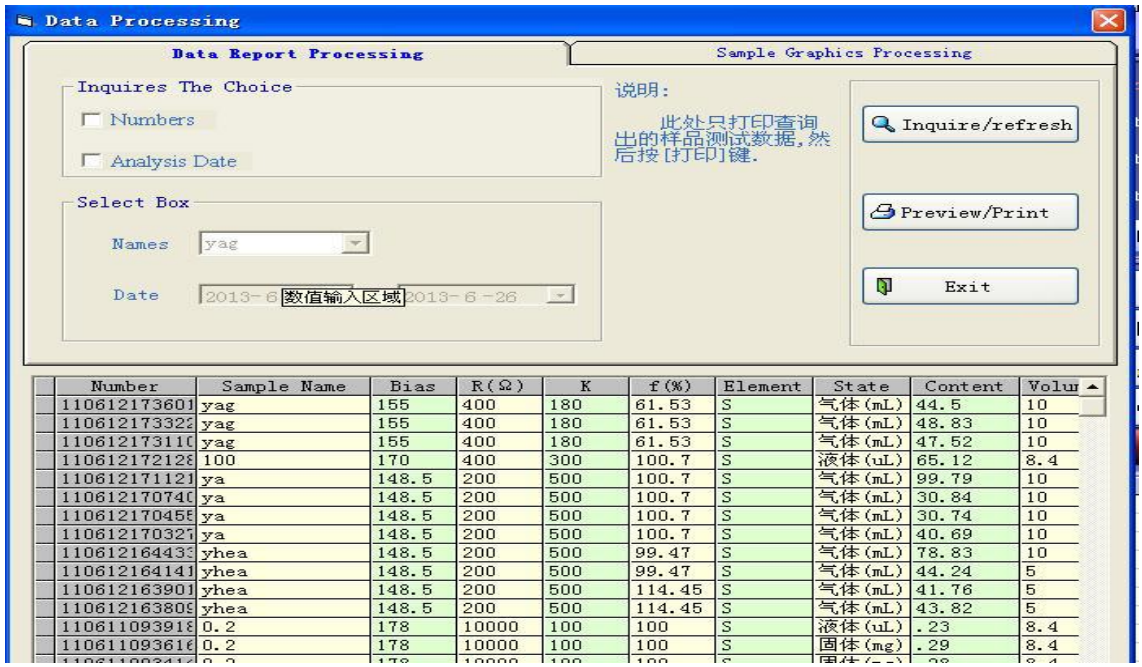

Figure 15

11．Average content:

After the end of the analysis of samples, click on " Data processing " and popup figure 15. In the " Query select " bar, select " sample number, test date, etc ". Enter the standard sample name and date in the input project field, click“Query”， delete the unneeded data,then click “Preview/Print” ,popup figure 14：

实验编号	样品编号	偏压	R(Ω)	K(倍)	f(%)	氯浓度	盐含量	实验日期
90218190307	样品名称	188.8	10000	1000	28.7	6.31597	10.41	2009-2-18
90218190532	样品名称	188.8	10000	1000	30	7.78	12.83	2009-2-18
90218200437	样品名称	188.8	10000	1000	99.9	3.6	5.93	2009-2-18
平均值						5.90	9.72	

Figure 14

12．Print data:

“Preview/Print”, The print icon on left of the main form and click the icon to printing.

13．Shutdown sequence：

First put “working position” to “balance position”. Turn off the power of instrument host, computer, monitor, printer, agitator and injector in turn. Change the fresh electrolyte to the titration cell and tidy up the instrument.

VII.Chemical reagent and Solutions preparation

The reagents were used analytical pure or above without special instruction. The water is deionizer water or secondary distilled water, impedance is greater 1MΩ.Determine sulfur, chlorine samples required chemical reagent as show in table 1.

Element	Reagents required	
Salt Cl	Silver acetate （CH3COOAg） chemicallyly pure	Glacial acetic acid GR

Preparation of electrolyte

Mixed 700mL HAC, 300mL double-distilled water, stored in airtight brown glass bottles and kept in dark cool place.

VIII.Regular failure and failure elimination

This product adopts microcomputer real-time control and strong professional. So the laypeople don’t optional repair under the failure. The following list regular failure and failure elimination for user reference as show in table 2. The following maintenance must be cut off the power.

Phenomenon	Analysis	Failure elimination
Stir bar doesn’t rotate	1. Power has not been connected or fuse bad	Check the power and replacing the fuse

	2. Between magnets and motor axis are loose	Locking screw
Baseline instability	1. Poor instrument chassis ground	Reconnect
	2. Titration pool reference arm has air bubbles	Eliminate air bubbles
	3. Titration pool is contaminated	Cleaning titration pool
Electrolyte pool can not reach scheduled bias	1. Poor water quality, non-deionizer water	Use deionizer water
	2. Contaminated electrolyte	Reconstituted electrolyte
	3. The chemical reagent can't reach requirements	Use the meet requirements of reagents
Trailing peak	1. Bias is too low	Increased bias or flushing titration pool
	2. Gain is too low	Increased the gain
	3. Titration pool were contaminated	Cleaning titration pool
Conversion rate is low	1. Inappropriate bias	Readjust
	2. Too little electrolyte	Add
Conversion rate is too high	1. Inappropriate bias	Readjust
	2. Gain too high	Reduce
	3. Standard sample was contaminated	Replacement
Poor reproducibility	1. Uneven samples	Change sample
	2. The injection quantity is not accurate	Inject sample
	3. Titration cell are polluted	Cleaning titration cell

IX.Transportation and storing

(1) Please carefully to transport instrument and do not turn over.

(2) Do not make it subject to any impact or vibration, and proof rain.

(3) Ambient temperature is – 20~40 ℃ and relative humidity is not more than 85% to store instrument.

(4) Instrument should avoid stored with the harmful substances which to cause instrument corrosion and electrical insulation performance reduce.

X.Packing list

NO.	Name	Qty
1	Computer	1
2	Salt content analyzer host	1
3	Centrifuge	1
4	Waterbath	1
5	Centrifuge tube	5
6	Vibrator	1
7	50ml micro-syringe	1
	50ul micro-syringe	2
	10ul micro-syringe	2
	1ml micro-syringe	1
	2ml micro-syringe	1
8	Needle（lengthening）	5
9	Communications line	1
10	titration cell	1
11	Stirrer	1
12	Power line	1
13	Standard sample	20