

Portable Water Quality Heavy Metal Rapid Analyzer

ATE3010

Feature

- Fast measurement, measurement time less than 5s.
- High sensitivity, detection limit less than 0.5ppb
- Detection for more than 10 kinds of heavy metal
- Good electrode performance, long life, stable and reliable, easy to maintain
- Low cost of use, low cost of actual consumables, less consumption, safe and non-toxic
- High detection accuracy, optimized algorithm design, detection accuracy better than 1ppb
- Intelligent operation, intelligent guide menu, online operation, support for secondary development
- Good portability, lightweight suitcase protective packaging, easy to carry

Application

- Extensible measurement of hexavalent chromium, nickel, manganese and other indicators
- Rapid detection of heavy metals in water quality by environmental monitoring agencies at all levels, environmental science institutes, universities, water plants, public security inspection departments, enterprises, etc.
- Applied to on-site emergency detection (such as emergency monitoring of water environment pollution accidents)
- Laboratory heavy metal detection and analysis
- Monitoring of surface water, groundwater, seawater, industrial wastewater and drinking water or other environmental water bodies

Description

ATE3010 is a kind of portable water quality heavy metal rapid analyzer, which adopts electrochemical rapid detection method for analyzing heavy metals. ATE3010 has a fast measurement time, which is less than 5 minutes (the fastest is less than 30s). The sensitivity is high and the detection limit is less than 0.5ppb. The detection accuracy is high and the algorithm design is optimized. The computer software control is $100\text{ppb} \leq \pm 2\%$ and the stand-alone operation is $100\text{ppb} \leq \pm 5\%$.

ATE3010 adopts independent glassy carbon working electrode (corresponding test item: Zn/Cd/Pb/Cu). It has independent gold working electrode (corresponding test item: Hg/As) and independent platinum counter electrode as well as independent silver/silver chloride reference electrode. Measurement standard liquid indication error is less than 3% (@100ppb) and repeatability RSD less than 2%. The design features of ATE3010 include intelligent de-spectrification algorithm, over 24-hour long-term measurement, multiple charging methods, intelligent menu navigation, large-capacity data



1. Performance parameters:

ATE3010	
Measured Parameters	More than ten kinds of heavy metal parameters such as Cu, Cd, Pb, Zn, As, Hg, Tl, Mn, Ni, Sb, etc. (which can be expanded to measure more parameters) Cu: 0.1ppb~25ppm Pb: 0.5ppb~25ppm Hg: 0.1ppb~6ppm Cd: 0.1ppb~20ppm Zn: 0.5ppb~20ppm As: 1ppb~20ppm Can be expanded Tl: 0.5ppb~15ppm Ni: 1.5ppb~200ppb Sb: 1.5ppb~20ppm Mn: 1.5ppb~6ppm Co: 1.5ppb~15ppm
Detection Range	Stripping Voltammetry: 0.1μg/L ~ 10mg/L Note: The detection range of different elements is slightly different
Repeatability	RSD≤2%
Indication Error	≤±10%
Detection Limit	≤0.5μg/L

1.1 Application Case

1.2 Case 1

Case Name: Simultaneous detection of heavy metal elements in quality control water samples containing Cd, Pb and Zn

Water-like Matrix: A mixed water sample containing several heavy metals was synthesized, containing Cd, Pb and Zn respectively, all at 100ppb

Test method: The content of Cd, Pb and Zn in the quality control water sample is calculated by the single calibration method.

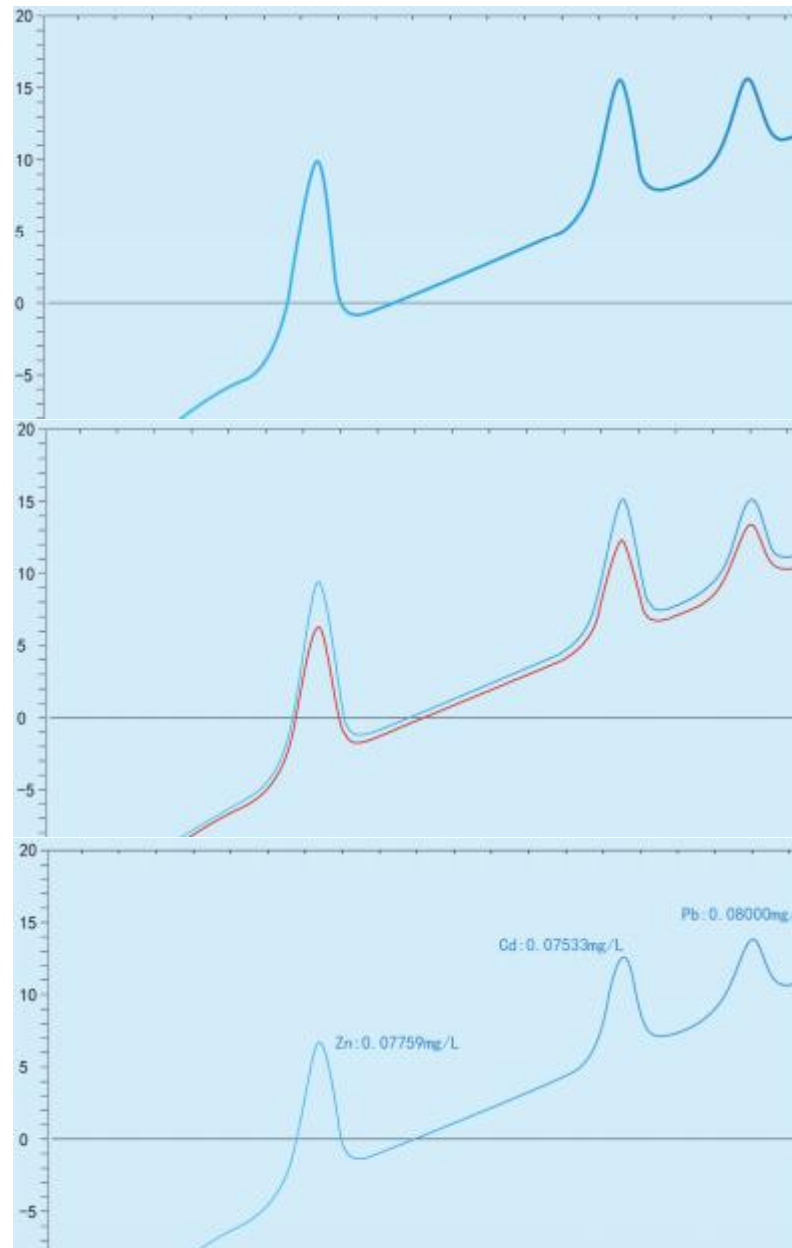
Step 1: Scan the blank solution (no peak smoothing is sufficient).

Step 2: Scan the standard solution (containing Cd, Pb, and Zn, all of which are 100 ppb) to obtain the respective peak current values of Cd, Pb, and Zn in the standard solution.

Step 3: Scan the quality control water sample (containing Cd, Pb, and Zn, all of which are 76 ppb) to obtain the

respective peak current values of Cd, Pb, and Zn in the water sample.

Step 4: Calculate the respective contents of Cd, Pb, and Zn in the water sample through the proportional relationship between the magnitude of the peak current and the concentration.



$I_p(\text{Cd}) = 15.4 \mu\text{A}$
 $I_p(\text{Pb}) = 15.39 \mu\text{A}$
 $I_p(\text{Zn}) = 9.65 \mu\text{A}$

$I_p(\text{Cd}) = 12.5 \mu\text{A}$
 $I_p(\text{Pb}) = 13.6 \mu\text{A}$
 $I_p(\text{Zn}) = 6.44 \mu\text{A}$

Through calculation, the quality control water sample contains 77ppb Zn, 75ppb Cd, and 80ppb Pb so it can be seen that the test results are relatively accurate.

1.3 Case 2

Case name: On-site actual test of surface water

Water-like Matrix: take several actual water samples from the bank of a river

Test method: Take the actual water sample as the matrix, add a certain amount of Pb, Cd, Zn, Hg, hexavalent Cr, standard solution (the concentration of each metal ion is 50ug/L), and use the instrument ASV (anodic dissolution, corresponding to measure Pb, Cd, Hg) module and colorimetric module (corresponding to the measurement of hexavalent Cr) were measured separately, and the actual water sample was tested for the recovery rate of standard addition.

Model	Test Item	Test results of adding 50ug/L standard sample			
		Before	After	Recovery value	Recovery rate with adding standard sample (%)
1	Pb	0.02	50.3	50.2	100.4
2	Cd	0.05	49.6	49.5	99.0
3	Zn	69.6	122.5	52.9	105.8
4	Hg	0.17	48.9	48.7	97.4
5	Cr	0.03	49.8	49.7	99.4

For the above standard samples (100ug/L), Pb and Cd were determined by plasma mass spectrometry, Zn by flame atomic absorption method, Hg by atomic fluorescence method, and Cr by spectrophotometer. The determination results are as follows:

Model	Test Item	ATE3010		Laboratory Instrument	
		Recovery value	Recovery rate with adding standard sample (%)	Recovery value	Recovery rate with adding standard sample (%)
1	Pb	101.3	101.3	101.5	101.5
2	Cd	98.8	98.8	99.2	99.2
3	Zn	100.5	100.5	98.8	98.8
4	Hg	96.9	96.9	104.0	104.0
5	Cr	98.5	98.5	102.8	102.8

Conclusion: The portable water quality heavy metal analyzer has the characteristics of small size, easy to carry, simple pretreatment, low detection limit, high detection accuracy, and fast detection speed. The test results have a good correlation with laboratory instrument methods, and can be very convenient and portable for emergency monitoring of outdoor on-site environment.

2 Advantages of emergency detection

1. Light weight and easy to carry.
2. Equipped with a special field emergency reagent kit, which can be directly selected to save time.
3. It adopts IP67 dust proof and waterproof grade design to adapt to harsh environments, and has the function of remaining power indicator. It is equipped with power adapter charging and car cigarette lighter for on-board charging, which is convenient for taking effective measures when the on-site power is insufficient.
4. The instrument reagents are composed of electrolyte, adjustment solution and standard solution. Among them, the commonly used copper-cadmium-lead-zinc electrolyte reagents are packaged in fixed powder with a shelf life of 1 year. Other reagents are common acid reagents, which can be configured by the user in the laboratory.
5. The instrument supports wireless printing function and prints historical measurement results on site (Bluetooth printer is optional).