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Therefore, all our employees are highly qualified after rigorous product training and working principles learning.

Drawell is specialized in R&D research. Our products include laboratory and medical instruments, such as Spectrophotometer, Refractometer, Microscope, Centrifuge, Chromatograph, Incubator, Drying Oven, Polarimeter, Balance, Homogenizer, AAS, Autoclave, Deep Freezer, XRF, XRD, Ultrasonic Cleaner, Freeze Dryer, Elisa Reader, Lab Furniture, FTTR, Water Bath, and etc. They are widely used in Pharmaceutical and food QC, Educational research, Environmental science, Chemical industry and other areas.



To keep sharp on the international market, we are committed to attending overseas

exhibitions, such as Arablab, PICCTON, Analytica Russia, Lab Africa, Analytica Munich, Analytica Latin America, Lab Thailand and etc. Now Drawell already has established business relationships with customers from more than 50 countries, and enjoyed a good reputation through reliable quality, competitive price and good service. Speaking of service, for all cooperated customers, we provide online installation guide, training and operation instructions to our customers. We're also capable of sending our professional engineers to customers' offices or factories to give local support, as our aim is to build and maintain long-term partnerships.

Drawell always warmly welcome your visit!

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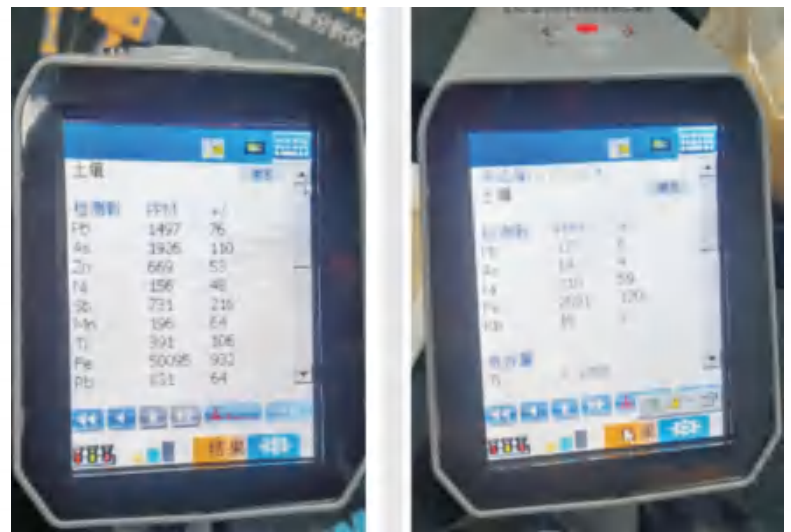


# Handheld XRF Soil Heavy Metal Analyzer

## DW-500、DW-500S

### Features

- Smaller, faster, more accurate, and more portable.
  - Integrates optoelectronics, microelectronics, semiconductors and computer technology as a new generation of handheld XRF with independent intellectual property rights.
  - DW-500 uses a new large-screen high-resolution LCD and a new digital multi-channel data processor for handheld analysis of heavy metal elements in the soil.
  - DW-500 gives in-situ testing of pollutants and soil restoration analysis, i.e. making effective testing of heavy metal elements, including mercury, cadmium, lead, arsenic, copper, zinc, nickel, cobalt, vanadium, chromium, manganese and others (DW-500S can test 5 more elements including Al,Mg,Si,S,P),or other elements as requested by customers.
- With excellent performance comparable to PCs, it is good at testing heavy metals with low content in soil.



### Applications

1. Soil pollution survey and environmental assessment
2. Emergency treatment of soil pollution • Soil remediation...

### Application strengths

**Expertise:** Heavy metal analysis software to detect heavy metal elements, e.g. mercury, cadmium, lead, arsenic, copper, zinc, nickel, cobalt, vanadium, chromium, and manganese in contaminated soil or more elements required by customers through intelligent one-key testing and intelligent judgment.

#### \* Soil heavy metal survey

With the built-in GPS, you can search for satellite signals in the field at any time, determine the geographic location of sampling points, fast survey a large scale of soil geological contaminated area, develop a pollution map, and monitor the pollution in each area in real time. You also can conduct environmental assessments on heavy metal pollution to various agricultural lands, residential lands, commercial lands, and industrial lands.

#### \* Emergency treatment of soil with heavy metal pollution

It is generally used for emergency treatment after pollution, and is able to quickly track pollution abnormalities on site, effectively identify the "stained" areas and the boundaries of polluted areas, and conduct real-time surveys.



**\* Assistance in soil remediation in contaminated areas**

It is used to classify the contaminated areas, delineate the key soil contaminated areas, optimize the priority according to the divided areas, improve the screening efficiency, and monitor the soil remediation in the contaminated areas in real time.



## Specifications

<b>Weight</b>	<b>Host: 1.50kg; with battery: 1.65kg</b>
<b>Dimension</b>	<b>250mmx75mmx270mm (length * width * height)</b>
<b>Excitation source</b>	<b>High-power high-performance X-ray microtube</b>
<b>Target</b>	<b>5 available targets for ray tubes are: gold (Au), silver (Ag), tungsten (W), tantalum (Ta), palladium (Pd)</b>
<b>Voltage</b>	<b>35KY-50KV voltage (changeable)</b>
<b>Filter</b>	<b>A variety of selectable filters, automatically adjusted according to different tested objects</b>
<b>Detector</b>	<b>High-resolution SI-PIN detector (DW-500S: optional SDD detector)</b>
<b>Detector refrigeration temperature</b>	<b>Peltier effect semiconductor refrigeration system</b>
<b>Standard film</b>	<b>316 external standard films/window protection cover (internal plus version standard films available)</b>
<b>Power supply</b>	<b>2 lithium batteries (7.2v\6600mAh)</b>
<b>Processor</b>	<b>High-performance ARM pulse processor</b>
<b>Operating system</b>	<b>Windows CE6.0</b>
<b>Data transmission</b>	<b>USB flash disc with two-way interface (32G)</b>
<b>Standard mode</b>	<b>Alloy Plus 6.0</b>
<b>Data processing</b>	<b>32G large-capacity data storage card: ≥80,000 sets of data and spectrograms</b>
<b>Display screen</b>	<b>High-resolution TFT industrial-grade colored high-definition touch screen. It is ergonomic, sturdy, dust-proof, and waterproof, clearly visible under any light conditions</b>
<b>Outline design</b>	<b>The integrated designed body is sturdy, waterproof, dustproof, antifreeze, shockproof, and can be used normally in harsh environments</b>
<b>Safe operation</b>	<b>“One key” detection, auto-lock, detection auto-stop functions. The X-ray will automatically be turned off if there is no sample in front of the detection window for 2 seconds. 3/2 of the shell of the device is covered with a 6061 aluminum alloy frame design, with better X-ray blockage.</b>
<b>Detection report</b>	<b>Customized detection report available as per the customers' demands</b>
<b>Element analysis</b>	<b>Mercury, cadmium, lead, arsenic, copper, zinc, nickel, Cobalt, vanadium, chromium, manganese and other elements can be detected at the same time. In addition, other elements can be detected according to customers' requirements.</b>

**Safe Protection Box**

The device is protected by a safe protection box that is waterproof, dustproof and drop-proof. The box meets the requirement in ASTM 05276-1998 (2009) and is tested in the cargo container drop method.





# Handheld XRF Mineral Analyzer

## DW-600、DW-600S

### Features

- Smaller, quicker, more accurate and more durable. Can be applied where there are extremely harsh analytical requirements in harsh environments.
- Signal processing, providing accurate and repeatable results and thus allowing users to achieve higher productivity and get a quick return on investment.
- The mature X-ray tube analysis system has passed the field test, is free of radioactive isotope. It can be used for quick and comprehensive ore study during field analysis.
- It has low sample requirements, but provides accurate test results. It is capable of accurately analyzing high-concentration samples, thus avoiding verification tests in the laboratory.



### Applications

The handheld ore analyzer is used for quick analysis and determination of nonferrous elements in mining, geology, soil environment, sediment and sediment.

It is widely applied in detection and analysis of ores, as well as slag refining analysis and archaeological research. It is applicable to all natural ores from phosphorus to uranium, slag, rock, mud and slurry, including gold ore, silver ore, copper ore, iron ore, tin ore, zinc ore, nickel ore, molybdenum ore, iridium ore, arsenic ore, lead ore, titanium ore, antimony ore, manganese ore, vanadium ore, iodine ore, sulfur ore, potassium ore, phosphate ore, uranium ore, etc. Test samples include solid, liquid, dust, powder, solid, fragment, filtrate, film and other tangible objects.



With the digital multi-channel technology, DW-600 brings lower detection limit, higher stability, better applicability and excellent performance comparable to desktop computers; In light and compact volume, the analyzer gives a full play in simpler and easier prospecting, exploration, and multi-element detection and analysis of various geological samples.

DW-600 handheld ore analyzer can be used for field analysis of a variety of ores. The mature X-ray tube analysis system, which has passed the field test, is free of radioactive isotope. It can be used for quick and comprehensive ore study during field analysis. It has low sample requirements, but provides accurate test results. It is capable of accurately analyzing high-concentration samples, thus avoiding verification tests in the laboratory.

**Application strengths**

**Test elements:** Detectable elements: more than 30 elements for standard configuration or more professional testing elements required by customers:

**Expertise:** special version of ore analysis software, using smart one-key testing.

**1. Custom-tailored working mode**

A variety of mineral sample modes for option and limited number modes for free addition along with customized working modes.

**2. Optimized value of the mine**

The high-definition camera can make more visualized observations over the detected ore veins or ore points, give accurate management and control of the mining process, and detect the ore grade at any time.

**3. Accurate and rapid analysis of raw ores, concentrates and tailings in the beneficiation to provide a solid basis for the valuation of ore grade, mineral trade, processing and recovery.**

**4. Environmental monitoring**

To monitor and detect the heavy metals in the soil around the mine, evaluate the restoration of the mine environment, and monitor the environment around the mine to the utmost extent.



**Specifications**

<b>Main configuration</b>	<p>1.One ore analyzer host;                  2.One standard sample;                  3.Two original rechargeable lithium batteries;                  4.Charger and power cord;                  5.One USB flash disk (32G);                  6.Five reinforced polypropylene films; One standard portable moisture-proof and shockproof box.</p>
<b>Standard mode</b>	Ore mode
<b>Self-diagnosis function</b>	This product is able to automatically diagnose the hardware, software, network, and battery, and generate logs for quick troubleshooting.
<b>Operating system</b>	Secure Windows CE 6.0 operating system
<b>Test method</b>	Basic parameter method, supporting the empirical coefficient method to correct the point contact or trigger control of testing, without long-time triggering in the whole test process. Or, press and hold the trigger to test samples as requested by customers.
<b>Filter</b>	8 filters, for automatically switching based on test elements;
<b>Excitation source</b>	High-power micro straight X-ray tube, W target material, 4W high-power X-ray tube, tube voltage 50KV, current up to 100μA; higher X-ray count rate, ultra-low electronic noise. No external standard sample is required in each test. Energy is automatically calibrated and checked during testing.
<b>Detector</b>	<p>Moxtek Si-pin (6mm<sup>2</sup>)                  Amptek Si-pin (25mm<sup>2</sup>)  <b>KETEK SDD detector ( DW-600S )</b></p>
<b>Test elements</b>	The product can be used to analyze metal elements in ore , such asTi, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Hf, Ta, W, Hg, Se, Au, Br, Pb, Bi, Zr, Nb, Mo, Ag, Cd, Sn, Sb, Re, Ir, Pt,Hg, Ru, Rh, Pd, etc. (DW-600S with SDD can test 5 more elements including <b>Mg, Al, Si, P, S</b> )



# Handheld XRF 3-way Catalyst Analyzer

## DW-980、DW-980S

### Features

- Light weight, easy carrying, high precision and high stability without destruction.
- Able to detect the content of Pd in 3s, Rh in 15s and Pt in 30s, and output the accurate data in 30s in the whole process.
- DW-980 uses Si-Pin detector and DW-980S uses high-resolution and high-count-rate SDD detector (resolution: 129ev), imported 50kv variable high-voltage X-ray tube, imported stepper motor and other core components.
- Catalyst detection limit for SDD: 20ppm for Pt, 10ppm for Pd and 10ppm for Rh.
- The internal ceramic honeycomb structure of the catalytic converter is coated with a carrier paint containing platinum, palladium and rhodium. Additional elements can be added to the coating to enhance the performance of the catalytic converter.
- Automotive catalysts mainly contain platinum, rhodium, palladium and other precious metal elements, which are applied to purify automobile exhaust emissions. Platinum group elements recycled from automotive catalytic converters account for more than half of the market share of platinum and palladium, so is the vast majority of rhodium. In addition to accurate measurement of platinum, palladium and rhodium, DW-980S can also detect other elements that are commonly added in carrier paints. There are also some elements to be analyzed to prevent fraud. These elements are added illegally by criminals in catalysts to increase the value of precious metals.
- It has a one-key fool-proof mode to avoid complex operation options and thus effectively prevent incorrect manual operations.
  1. One-key power-on/off operation and automatic calibration without manual operation;
  2. 45s from startup to testing, and 0.8s reading of the grade and other data;
  3. One-key sample testing, with software for automatic timing lock and stop;
  4. Automatic X-ray shutdown within 2s in the absence of samples in front of the test window.



### Application

Determination of Pt, Pd and Rh in 3-way catalytic converter of used automobile

In recent years, the composition and price of platinum group metals (PGM) such as platinum (Pt), palladium (Pd) and rhodium (Rh) in three-way catalytic converters fluctuate more than ever before, which has increasing impact on the purchase, trading and recycling of used three-way catalytic converters.

For a single catalytic converter, the price of PGM components may be less than \$100 or greater than \$1,000.

These materials are usually ground into powder and then mixed for trading. Therefore, businesses and recyclers should be able to:

1. Identify catalytic converters or mixtures with high platinum group metal content;
2. Trading at a reasonable price;
3. Identify whether the mixture contains fake or inferior substances. It is critical to determine the platinum, palladium and rhodium content in catalytic converters of used automobiles in real time, thus maximizing profits and avoiding considerable economic losses.



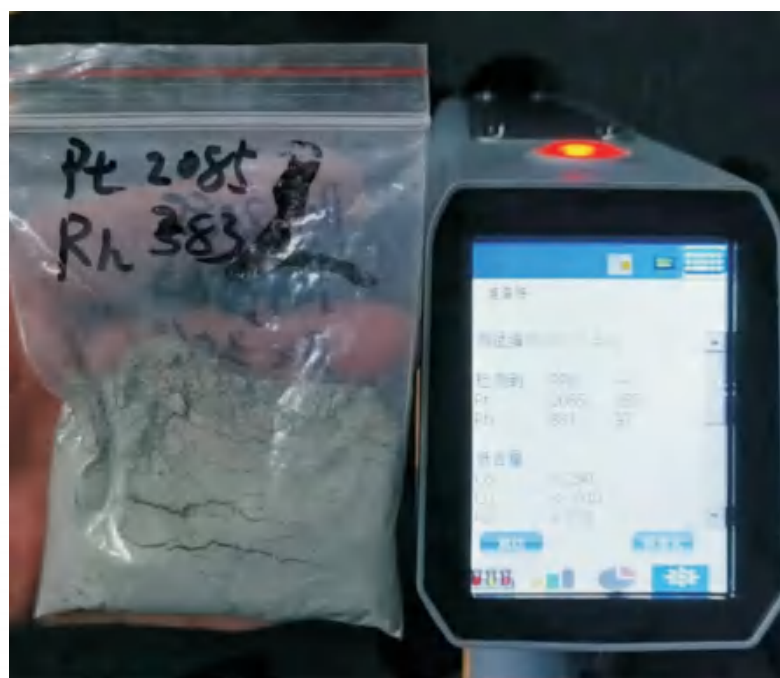
## Specifications

<b>Detector</b>	<b>KETEK ultra-large SDD detector (resolution: below 129ev), Peltier effect semiconductor refrigeration system, suitable for simultaneous recording of analytical data and spectrogram.</b>
<b>Excitation source</b>	<b>Moxtek high-power micro X-ray tube, W target material, 4W high-power X-ray tube, variable voltage tube (50KV), tube current up to 200<math>\mu</math>A.</b>
<b>Calculation method</b>	<b>Alloy 8.0 and FP-EC calculation methods. This instrument has been calibrated before delivery. It is able to build a specific correction curve and suitable for precise testing of specific samples.</b>
<b>Operating software</b>	<b>Windows CE6.0 (the latest version), high-resolution TFT industrial color HD touch screen, ergonomic, solid, dustproof, waterproof, clearly visible under any light conditions.</b>
<b>Heat dissipation</b>	<b>Due to the large-scale aluminum alloy and silica gel, the heat dissipation area is 1/3 larger than the counterpart. The integrated body is solid, waterproof, dustproof, freeze-proof and vibration-proof, which can be used normally in harsh environments.</b>
<b>Data display</b>	<b>Elements can be displayed or adjusted according to the test requirements.</b>
<b>Data export</b>	<b>Direct export by the storage device SD card or USB flash disk; export by PC software;</b>
<b>Main configuration</b>	<b>1. One meter                      2. One box                      3. Two batteries                      4. One charger 5. One manual of paper version                      6. One 316 disk                      7. One anti-fall wrist strap 8. One USB flash disk for software data backup 9. Five window films</b>
<b>Analysis mode</b>	<b>3 standard elements: Pt, Pd and Rh, and 3-way carrier elements (Ce, Zr, Ba, Ni, Se, Ta, Pb, Ti, W)</b>

### Sample preparation

First, remove the ceramic carrier from a three-way catalytic converter. Then, take the honeycomb ceramic out of the metal enclosure. Finally, collect the catalyst. Automotive catalysts consist of a ceramic body, which is largely made of cordierite and coated with platinum-containing metal. Therefore, the whole ceramic should be sorted, crushed and ground, and also often mixed with other catalysts. On the contrary, the metal-supported converter should be first crushed or ground. Then metal components and coating powder containing precious metals are separated with a magnet or by winnowing. Due to enrichment, the PGM content of the coating in the metal catalytic converter is higher than that of the ceramic converter.

In both cases, the material is crushed to a particle size of less than 250 $\mu$ m, followed by transfer into an XRF sample cup and analysis on a test bench.





## Handheld XRF Alloy Analyzer DW-1688、DW-1688S

### Features

- Smaller, quicker, more accurate, and more portable
  - It is specifically designed for NTD and PMI users, and the detection of places that are unreachable, and welds.
- It has excellent analysis performance to low content Ti v.
- DW-1688 can analyze common alloys in one second or less. The system is built on the Microsoft WINCE platform, which has better compatibility with the computer platform in facilitating data communication. The users who want to use the device need only to know how to use a computer.
  - Mirror system design is adopted in this device. The temporary files generated during system operation will be automatically deleted after the device restarts, and it can run smoothly as a new one for almost 10 years. One key system test, one step from startup to test, the test has never been so convenient.



## Specifications

<b>Weight</b>	Device: 1.50kg, 1.65kg with battery.
<b>Dimension</b>	250mm x 75mm x 270mm (L*W*H)
<b>Excitation source</b>	High-power high-performance X-ray microtube
<b>Target</b>	5 available targets for ray tubes are: gold (Au), silver (Ag), tungsten (W), tantalum (Ta), palladium (Pd)
<b>Voltage</b>	35kV-50kV voltage (changeable)
<b>Filter</b>	A variety of selectable filters, automatically adjusted according to different tested objects
<b>Detector</b>	High-resolution Si-Pin detector (DW-1688S: optional SDD detector)
<b>Detector refrigeration temperature</b>	Peltier effect semiconductor refrigeration system
<b>Standard film</b>	316 external standard films/window protection cover(internal plus version standard films available)
<b>Power supply</b>	1 lithium battery (7.2v\6600mAh)
<b>Processor</b>	High-performance ARM pulse processor
<b>Operating system</b>	Windows CE6.0
<b>Data transmission</b>	Hotspot sharing via Bluetooth and Wifi
<b>Standard mode</b>	Alloy Plus 6.0
<b>Data processing</b>	32G large-capacity data storage card: >80,000 sets of data and spectrograms
<b>Display screen</b>	High-resolution TFT industrial-grade colored high-definition touch screen, it is ergonomic, sturdy, dust-proof, and waterproof, clearly visible under any light conditions
<b>Outline design</b>	The integrated designed body is sturdy, waterproof, dustproof, antifreeze, shockproof, and can be used normally in harsh environments.
<b>Safe operation</b>	"One key" detection, auto-lock, detection auto-stop functions. The X-ray will automatically be turned off if there is no sample in front of the detection window for 2 seconds. 3/2 of the shell of the device is covered with a 6061 aluminum alloy frame design, with better X-ray blockage.
<b>Detection Report</b>	Customized detection report available as per the customers' demands
<b>Element analysis</b>	Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Hf, Ta, W, Pb, Bi, Zr, Nb, Mo, Cd, Sn, Sb, Re, In, Au, Ag, Pt, Pd, Ru, Rh, Ir, etc. (DW-1688S can test 5 more elements including Al, Mg, Si, S, P)

### Safe Protection Box

The device is protected by a safe protection box that is waterproof, dustproof and drop-proof.

The box meets the requirement in ASTM 05276-1998 (2009) and is tested in the cargo container drop method





## DW-8000 Handheld XRF Gold Analyzer

The DW series analyzers are configured with powerful miniature X-ray tubes, Si-PIN detectors or highly advanced silicon drift detectors (SDDs), specialized filters, and multibeam optimization for the ultimate in XRF field analysis. The actual overall value of the DRAWELL analyzer is embodied in the following: it can make correct decisions in real-time without relying on laboratory tests far away from the detection environment.



### Application



### Specifications

<b>Weight</b>	Device: 1.50kg, 1.65kg with battery.
<b>Dimension</b>	250mm x 75mm x 270mm (L*W*H)
<b>Excitation source</b>	High-power high-performance X-ray microtube
<b>Target materials</b>	Five target materials of X-ray tube available: gold (Au), silver (Ag), tungsten (W), tantalum (Ta) and palladium (Pd)
<b>Voltage</b>	35kV-50kV voltage (changeable)
<b>Filter</b>	A variety of selectable filters, automatically adjusted according to different tested objects
<b>Detector</b>	High-resolution Si-Pin detector
<b>Detector refrigeration temperature</b>	Peltier effect semiconductor refrigeration system
<b>Standard film</b>	External 316 standard film/window protection cover (Optional built-in standard film, plus version)
<b>Power supply</b>	1 lithium battery (7.2V\6600mAh)
<b>Processor</b>	High-performance ARM pulse processor
<b>Data processing</b>	32G large-capacity data storage card: ≥80,000 sets of data and spectrograms;
<b>Display screen</b>	High-resolution TFT industrial-grade colored high-definition touch screen, it is ergonomic, sturdy, dust-proof, and waterproof, clearly visible under any light conditions
<b>Outline design</b>	The integrated designed body is sturdy, waterproof, dustproof, antifreeze, shockproof, and can be used normally in harsh environments.
<b>Safe operation</b>	"One key" detection, auto-lock, detection auto-stop functions. The X-ray will automatically be turned off if there is no sample in front of the detection window for 2 seconds. 3/2 of the shell of the device is covered with a 6061 aluminum alloy frame design, with better X-ray blockage.
<b>Detection Report</b>	Customized detection report available as per the customers' demands
<b>Element analysis</b>	Au, Pt, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Hf, Ta, W, Pb, Bi, Zr, Nb, Mo, Cd, Sn, Sb, Re, In, Ag, Pd, Ru, Rh, Ir, etc.