RayKol

Knowledge Optimized Laboratory

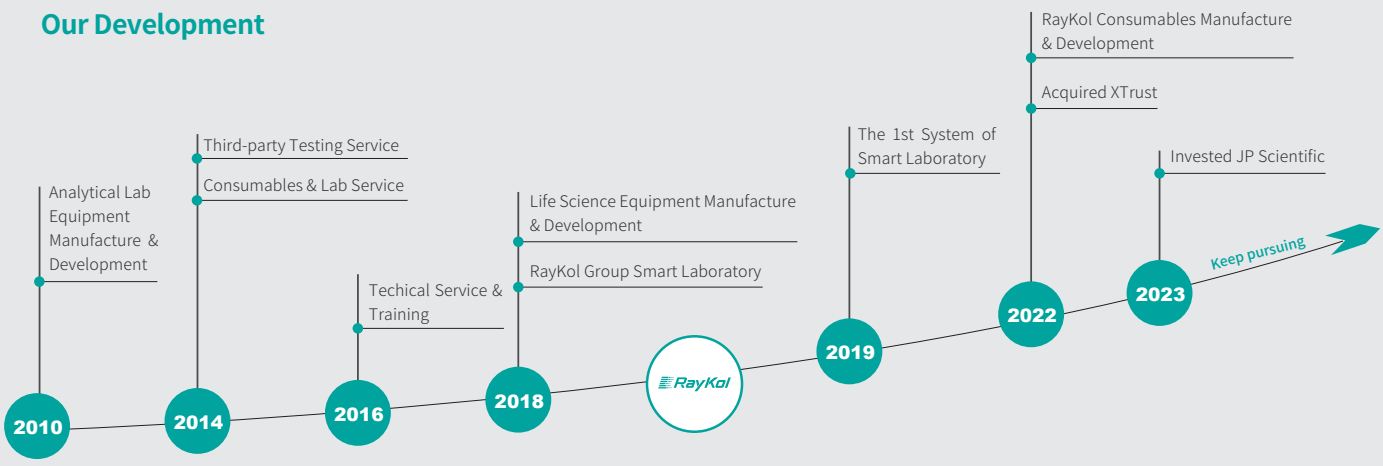
RayKol Group Product Catalogue

RayKol Group Corp., Ltd

About RayKol

RayKol Group(Xiamen) Corp., Ltd. is a professional manufacturer and solution provider of smart automated laboratories, dedicated in improving the performance of the testing and inspection industry. The core business covers five major fields: environmental testing, food safety, pharmaceutical analysis, life science, and new energy materials. The customer groups include government agencies, research institutes, private sectors and commercial laboratories. RayKol´s market share ranks among the top in the industry of laboratory automation solution. With high quality products and services, RayKol Group is really glad to help with customer´s needs.

Our Development



Comprehensive ISO certified

SGS Certified Supplier

Product Catalog

DRQ

Automated QuEChERS Handling Platform

The DRQ Automated QuEChERS Processing Platform offers an efficient solution that optimizes workflows, enhances precision, and minimizes human error. Crucially, DRQ also reduces lab personnel's exposure to hazardous reagents, directly addressing these challenges. Besides, the final step in sample preparation before chromatographic analysis typically involves concentration and filtration. DRQ-B Automated Concentration and Filtration Platform integrates the entire workflow of concentration, internal standard addition, volume adjustment, and filtration into a single automated process. This significantly boosts efficiency and minimizes human error. Whether for pesticide residue detection or veterinary drug residue analysis, the DRQ-B comprehensively automates these critical steps, ensuring precise and efficient sample preparation for a wide range of applications.

Features:

Efficient, Stable & Automated
It integrates pre-treatment steps such as liquid handling, homogenization, extraction, purification, and layer separation all in one.

User-defined Operation Process
Touch and hold on the touchscreen, allowing for dragging of step icons to the desired order position.

Extended Functionality
To complete automation of the QuEChERS method, include filtering into chromatography vials.

DRQ-A Automated QuEChERS Handling Platform:

Functional Modules:

- Sample transferring & gripping
- Automated capping to 50mL & 15mL vials
- Solvent dispensing via syringe pump
- Supernatant layer separation via 5mL ADP tips
- Extraction salts dispensing module
- Homogenizer bead adding module
- Vortex mixing module
- Vertical shaking module
- Centrifugation with cooling

Parameter:

Sample capacity : Max. 60 positions
Sample tube : 50mL / 15mL vials
Software : Touch screen control
Dimension : 1430mm(L)×820mm(D)×2130mm(H)

DRQ-B Automated Concentration and Filtration Platform:

Functional Modules:

- Sample transferring & gripping module
- Automated capping to 15mL & 2mL vials
- Supernatant layer separation via 1mL ADP tips
- Vortex mixing module
- Nitrogen evaporation module with endpoint detection and reconstitution

Parameter:

Sample capacity : Max. 60 positions
Sample tube : 15mL centrifuge vials / 15mL stemmed glass tubes / 2mL chromatography vials
Software : Touch screen control
Dimension : 1430mm(L)×820mm(D)×2130mm(H)

Application Fields:

Applicable for the detection of pesticide residues in plant-based foods, medicinal materials, tobacco, tea, and other fields utilizing the QuEChERS pretreatment method.




SPEVA

Automated SPE & Evaporation System

RayKol SPEVA is designed to integrate solid phase extraction and nitrogen evaporation processes. It automatically completes the steps of conditioning, sample loading, rinsing, drying and elution, while continuously evaporating and solvent replacement of the eluent and then passing through the cartridge again. No human intervention is required during operation, freeing laboratory personnel and safeguarding their health. With innovative and compact structure design of pump and valve, SPEVA exhibits the features of high throughput and efficiency with accurate results, significantly improving the detection capabilities of laboratories.

Features:

- **Integrated design of enrichment, purification and concentration**
  Solid phase extraction steps such as conditioning, sample loading, rinsing, drying, and elution, as well as eluent concentration, are all automatically performed without the need for manual intervention.
- **Multiple sampling modes to meet different needs**
  Different sampling modes can be selected to easily address samples from various fields such as large volume environmental water samples, fruits and vegetables, fish, shrimp and poultry, blood and urine, herbal medicine and pharmaceuticals.
- **Accurate flow control and precise experimental results**
  Using a high-precision syringe pump with plunger flow path system, the column plunger directly fits the packing material, eliminating solvent retention space. The set rate of the high-precision syringe pump is the flow rate through the column, unaffected by the sample' s own characteristics, ensuring the accuracy of experimental results.

Product series:

- SPEVA 08N SPE Automated Sample Purification and Concentration System
- SPEVA 08 Automated Solid Phase Extraction
- SPEVA 08N(PFC) Automated Sample Purification and Concentration System for PFAS analysi
- SPEVA 08(PFC) Automated Solid Phase Extraction for PFAS analysis

Parameter:

SPE extraction channel	: 8
Batch evaporation	: max. 48 samples
Sample capacity	: 48, 80
Sample volume	: 1mL to 20L
Sample loading	: via standard needles, pipette tips, large-volume loading kit
SPE column size	: 1, 3, 6, 12, 20mL
Solvent capacity	: 6 kinds
Software	: Touch screen control
Dimension	: 100cm x 65cm x 70cm

Application Fields:

Food	Environmental	Other fields
Determination of pesticide and veterinary residues in food samples	Determination of organic pollutants in environmental samples	Pharmaceutical industry, biological samples, cosmetics, etc

Fotector series

Automated Solid Phase Extraction

RayKol Fotector series Automated Solid Phase Extraction System can perform fully automatic solid phase extraction for enrichment and purification, designed for pre-treatment of large sample batches. With precise flow rate control and repeatable operation, it substitutes manual SPE for higher accuracy and parallelism. Also, its compact design can fit in fume hood to minimize chemical exposure to lab technicians. It can be applied to any analysis required solid phase extraction, such as residual pesti cides and veterinary drugs in foods, harmful organic compounds in environments, toxicoloigical analysis of urine and blood.

Features:

- **Fully automatic process**
  Fully automatic solid phase extraction, no need for manual intervention. Efficient operation via separate positioning for racks and quick solvent switching using 12-way valve, can optimally reduce the duration of mechanical movement in automated SPE.
- **Stable performance in parallelism and reproducibility**
  Programmed method with mechanical operation, to avoid interference from the SPE column condition. User can self-define the rinsing mode for sample-loading needle cleaning, to avoid cross-contamination.
- **Plunger sealing**
  Plunger closely attached on the column packing without any gap, to ensure the accurancy of flow rate, avoid interference from samples and columns.
- **Continously process for sample batch**
  Simultaneously process all channels per each steps; continously process all samples per batch.
- **Remote monitoring**
  Real-time monitoring remotely, to minimize contact with hazadous chemical reagents.

Parameter:

Extraction channel	: 2, 6
Sample capacity	: 20, 60
Sample volume	: 10mL to 20L
SPE column size	: 1, 3, 6, 12, 20mL
Solvent capacity	: 8
Software	: PC control
Dimension	: 62cm x 38cm x 63cm; 68kg
Power	: 450W

Application Fields:

Environment, food, forensic, blood and urine, traditional Chinese medicine.

Product series:

Fotector Plus Automated Solid Phase Extraction
Fotector Plus(PFC) Automated Solid Phase Extraction for PFAS analysis
Fotector-02HT Automated Solid Phase Extraction
Fotector-08HT Automated Solid Phase Extraction
FS360 Automated Solid Phase Extraction




ASPE Ultra

Automated Solid Phase Extraction

RayKol ASPE Ultra series automated solid phase extraction system is specialized in sample pre-treatment for large volume water samples, targeted to sample preparation for analysis of organic pollutants in drinking water, tap water, source water, surface water and sewage.

This SPE system can automatically complete entire process of filtering, conditioning, loading, rinsing, drying, eluting, concentration for large water sample. It can be applied to purification and enrichment of analytes before water quality testing. Full automation of ASPE Ultra allows unattended operation, minimize exposure to toxic reagents, ensure safety to all laboratory personnel.

Features:

- **Good parallelism and repeatability**
  Plunger closely attached to SPE cartridge, no space gap in between, to precisely control the flow rate of samples and solvents through packing, ensure repeatability and reliability. Independent pump valve system, batch of samples run synchronously and continuously through all process without interference, ensure each sample treated under same condition, avoid effect of other factors to parallelism.
- **Effectively avoid outer environmental influence**
  Light-proof housing design, protect sensitive samples from light exposure of laboratory environment.
- **Multi-function and good compatibility**
  Compatible with 3mL, 6mL, 12mL, 20mL SPE cartridges and 25mm, 47mm SPE disks.
- **Remote wireless real-time monitoring**
  The entire operating process can be monitoring and automatically generate monitoring logs, which can be recorded and checked.

Parameter:

Extraction channel	: 6, 8
Sample capacity	: 6, 8
SPE column size	: 3, 6, 12mL
SPE disk size	: 25, 47mm
Solvent capacity	: 6
Software	: Touch screen control
Dimension	: 66cm x 58cm x 76cm; 84kg
Power	: 450W

Application Fields:

Tap water, drinking water, surface water, sewage, source water.

Auto EVA 60

Automated Evaporation System

RayKol Auto EVA 60 Automated Nitrogen Evaporation System is an automated parallel evaporator for large batch of samples. Nitrogen evaporator performs rapid and safe evaporation to samples under water bath heating and nitrogen blowing. Operaters can have direct control and real-time monitoring during the entire process through their remote electronic devices.

Features:

- **High-throughput & Efficient evaporation**
  With multi-channel and parallel designed,large volume of samples can be evaporated at the same time. Gentle temperature, low pressure steam heating technology facilitates fast evaporation and precise temperature control.
- **Flexible**
  Flexible for large volumes of samples,the nitrogen blowing needle is easy to remove and install manually and can be flexibly adjusted according to the sample volume. And a broad selection of racks can be accommodated to workflow or throughput requirement.
- **Full automated , Start and walk away**
  Auto EVA is fully automated and easy to use, allowing you to proceed with other tasks while it gets on with the job at hand.
- **Concentration process Visible**
  With the front window and internal lights all the concentration process is visible can be monitored by touch-screen device.

Parameter:

Nitrogen channel	: 10
Sample capacity	: 60, 100
Sample vials	: 10 to 100mL
Temperature control	: PID
Temperature range	: Room temperature to 90°C, precise to 1°C
Software	: Touch screen control
Dimension	: 55cm x 40cm x 58cm; 45kg
Power	: 1700w

Application Fields:

Environment
Sample concentration in analysis of water, soil and gaseous samples

Food
Sample concentration in detection of pesticide and veterinary drug residues

Other fields
Biochemical analysis, pharmaceuticals, polymer materials

Auto EVA 80

Automated Evaporation System

RayKol Auto EVA 80 Automated Evaporation System is the lastest upgrade of previous concentration solution Auto EVA 60. Integrated the features of Auto EVA 60, upgraded Auto EVA 80 high-throughput nitrogen evaporator continues to have needle following function, to maintain optimal distance between needle tips to liquid level; also to ensure gas above samples always guarded by positive-pressure nitrogen gas, to avoid any oxygen and moist from the air; hence, to achieve efficient and parallel concentration to all samples.

Features:

- **Multi-channel design**
  Large batch processing capability, simultaneously evaporate up to 80 samples; Interchangeable sample rack compatible with Fotector Plus Automated Solid Phase Extraction, directly transfer collection rack of Fotector into Auto EVA 80 for rapid nitrogen blowing evaporation, to eliminate repetive and time-consuming large sample transfer.
- **Good parallelism of nitrogen blowdown**
  Utilize high-strength diameter-reduction nitrogen blowing needles allowing the needle tips at the centre of sample tubes. Each nitrogen blowing needle tip has the same inner diameter, ensuring same flow rate of each needle tip, to provide good consistency for sample evaporation.
- **Transparent water bath sink**
  Three-sided transparent glass window, to maximize viewing area to sample rack for clear observation and monitoring.
- **Comprehensive safety protection**
  Built-in exhaust fan with active exhaust pipeline, to minimize the risk of reagent exposure.

Parameter:

Nitrogen channel	: 8
Sample capacity	: 80, 48
Sample vials	: 10 to 100mL
Water bath temperaure	: ambient to 60°C
Gas flow	: 0 to 3.0mL/min
Software	: 10-inch built-in touch screen control
Dimension	: 40cm x 48cm x 54cm; 48kg
Power	: 1500W

Application Fields:

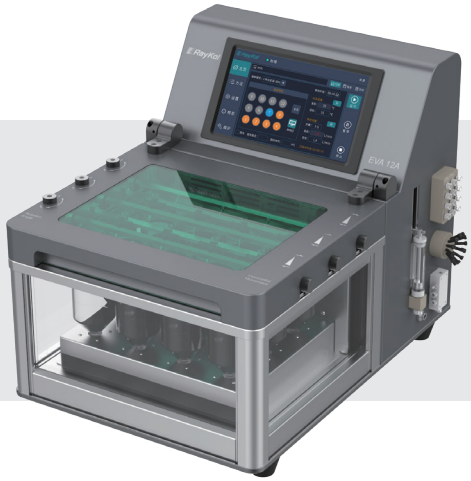
Environment
Sample concentration in analysis of water, soil and gaseous samples

Food
Sample concentration in detection of pesticide and veterinary drug residues

Other fields
Biochemical analysis, pharmaceuticals, polymer materials

Auto EVA 12

Automated Evaporation System



RayKol Auto EVA 12 is a nitrogen blow-down evaporation system that provides automated evaporation of up to 12 samples in parallel with end-point detection. The system adopts the vortex airflow technology,which can rapidly and gently evaporate the samples in parallel. Equipped with end-point detection sensor, the system can automatically detect the endpoint, which can efficiently concentrate up to your predefined residual volume with either 0.5 mL or 1.0 mL end-point stems.

Features:

- **Efficient evaporation with good parallelism**
  Uniform gentle heating combine with vortex airflow technology, the system provide rapid and gentle evaporation for sample in parallel. Each row of nozzles can be controlled individually. Airflow is adjustable,flow rate can be set in a gradient according to the decreasing sample volume.
- **Batch processing**
  Able to evaporate 12 positions at a batch. With liquid level sensor, it can detect 1mL endpoint to sample tube stem.
- **Clear viewing for observation**
  Three-sided transparent glass windows with internal light greatly improves the visibility of the process of nitrogen blowing and concentration.

Parameter:

Nitrogen channel	: 12
Sample capacity	: 12
Sample vial	: 60mL, 250mL stemmed glass tube
Water bath temperaure	: ambient to 60°C
Gas flow	: 0 to 5.0mL/min
Software	: 10-inch built-in touch screen control
Dimension	: 58cm x 46cm x 45cm; 41kg
Power	: 1500W

Application Fields:

Aqueous sample concentration in the analysis for food, water, environment, residual pesticides and verterinary drugs, life science, pharmaceuticals.

Auto EVA Mini

Automated Evaporation System

RayKol Auto EVA mini Automated Evaporation System is designed for small-volume sample concentration, utilizes nitrogen blow with rack heating for nitrogen evaporation. It's compatible with 2mL chromatographic vials, 2 and 5mL centrifuge vials, make it applicable to batch evaporation of 2mL purified solution in QuEChERS methods.

Features:

- **Precise control on nitrogen channels**
  Automatically precisely control the air flow rate of each needle, which can ensure the consistent gas flow rate; Equipped with its own switch to shut down gas flow when other rows of microplate wells are not in use to conserve nitrogen gas.
- **More automated evaporation**
  Needles able to follow the liquid level during concentration with adjustable descending height and rate, so to accelate the solvent volatilization. The heating temperature can be precisely controlled from ambient to 100°C and temperature difference between each well is not exceed ±1°C.
- **Graphical software interface**
  Built-in 7 inch touch screen, all-in-one software control, all parameters can be set and saved, including temperature, needle tracing speed. And all saved methods can be recalled to reproduce following process.

Parameter:

Nitrogen channel	: 4
Sample capacity	: 24
Sample vial	: 2mL/5mL centrifuge vials, 2mL GC vials
Heat block temperature	: ambient to 100°C
Gas flow	: 0 to 3.0mL/min
Software	: 7-inch built-in touch screen control
Dimension	: 47cm x 25cm x 43cm; 25kg
Power	: 1000W

Application Fields:

Food, Environment, Biology, Pharmacy.

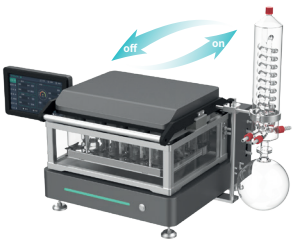
MPE Pro

High-throughput Vacuum Parallel Evaporator

RayKol MPE Pro Automated Vacuum Parallel Evaporator, not only remains the features of MPE series, but also integrates with more functional modules for automation. It can perform high-throughput vacuum evaporation with precise vacuum gradient control, to minimize the risk of analyte lose caused by over boiling. MPE Pro can bring better user´s experience by minimal operating steps, user would only need to place the sample tubes, close the cover plate then click to start the evaporation. It´s capable of automatic sealing and endpoint determination; with the automatic condensation recovery system MPE ASR, it can reach higher automation in use and operation for lab workflow.

Simpler Steps:

01. Place the sample tubes



02. Close the cover plate

03. Click to Run

Features:

- **Precise Pressure Performance**
  Available in various pressure control modes: manual decreasing, programmed decreasing, frequency-invert decreasing. Able to support 20-step gradient pressure control, with frequency-invert pump as optional configuration, to reach smooth gradient changing for vacuum.
- **Flexible in Sample Batch**
  Separate flow path control, selectable in channel numbers and positions. Use with flange-side sample tubes for clear sealing. Optional IR module for 1mL endpoint detection.
- **MPE ASR Automatic Solvent Recovery System**
  With a 3L solvent receiving bottle, and ⩾ 5L condensation module, to accommodate large volume requirement. For solution mixed with high and low boiling point solvents, MPE ASR can discharge the low boiling point solvent first to avoid interference for following procedure.

Parameter:

Sample capacity	: 12, 20, 48
Sample vial	: 800mL, 380mL, 320mL, 250mL, 70mL, 65mL glass tubes
Water bath temperature	: ambient to 80°C
Software	: 10-inch touch screen control
Dimension	: 76cm x 54cm x 40cm
Power	: 2000W

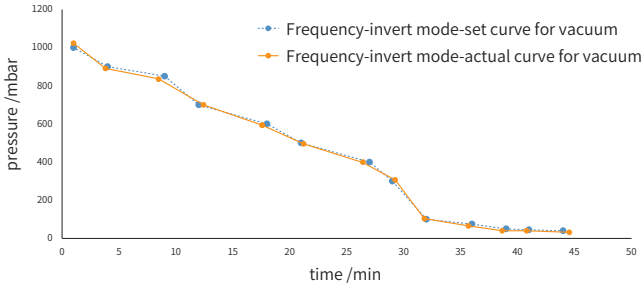
Application Fields:

Aqueous sample concentration in the analysis for food, water, environment, residual pesticides and verterinary drugs, life science, pharmaceuticals




MPE ASR

Automatic Condensing Waste Discharge System



Features:

- **Versatile Condensation Receiving Module**
  For mixed solvent with high and low boiling point in evaporation, automatic condensing waste discharge system can discharge low-boiling solvent first, to avoid interference with the subsequent samples.
- **Precise Pressure Control**
  Available in various built-in pressure-decrease modes: manual, programmed, frequency-conversion. Flexible to different requirements: able to support for 20-step gradient control, with optional frequency-conversion pump, able to control gradient change of pressure smoothly.

Application Fields:

Aqueous sample concentration in the analysis for food, water, environment, residual pesticides and verterinary drugs, life science, pharmaceuticals




MPE

Automated Vacuum Evaporation System

In environmental pollution analysis and food safety analysis, in order to obtain accurate and reliable detection results for trace analysis, experimenters continue to pursue rapid concentration and no loss sample evaporation technology.
Raykol MPE High-throughput automated vacuum evaporation system is a truly modern system combined with precise digital vacuum control and consistent precise temperature control system to concentrate multiple samples in parallel increases efficiency, accuracy and safety

Features:

- **Reliable and Efficient**
  The low-temperature heating system assures consistent and gentle heating of all samples in parallel to prevent the loss of volatile analytes in the sample. The system evaporating process is effective and fast, it could evaporate16 samples with large-voume(100-200 mL) at the same time.
- **Safe and environmentally friendly**
  The system has an effective condenser system to recover vapor solvents. The entire corrosion-resistant, PTFE system ensures the safety of users and prevents vapor from leaking into the atmosphere，the recovery rate for acetonitrile (cooling at 0°C) can reach max. 99%.
- **Flexibility & Adaptability**
  Compatible with various types of sample vials for different applications. Sample volumn can be up to 200mL, no need manual intervention.
- **Anti cross-contamination**
  The quick-change sealing cover facilitates the quick change of different sample tubes. The cover heating prevents the liquid from condensing on the cover plate and helps the solvent volatilization. Separate flow design can also prevent cross-contamination of samples from different positions.

Parameter:

Sample capacity	: 16, 36
Sample vial	: 60, 250mL stemmed glass tube; 70, 320mL glass tube
Water bath temperature	: ambient to 80°C
Software	: 7-inch touch screen control
Dimension	: 67cm x 44cm x 34cm; 57kg
Power	: 2000W

Application Fields:

Food, pesticide residues, soil, environment, textiles.

HPFE Series

Pressurized Fluid Extraction System

Extraction of organic compounds from complex matrices is commonly seen as a challenging problem in sample preparation. Analytes of insterest such as polycyclic aromatic hydrocarbon (PAH) and polychlorinated biphenyls (PCB) can have strong absorption with sample matrix, can cause failure in conventional liquid extraction.

Raykol HPFE Series Pressurized Fluid Extraction System can raise the boiling point of solvents using high pressure. With high temperature, solubility and diffusibility of target compounds are increased substantially, to reduce extraction time to 15-30 minutes from more than 10 hours and decrease solvent consumption to 20-50mL from 200mL,therefore to boost efficiency and lower cost.

Features:

- **Good Compatibility**
  Available for 4 types of solvents, can dispense and mix in any ratio; Range of extraction cells: 11 - 120mL; Range of collection tubes: 60 - 240mL, compatible to concentration module; Can apply to any extraction from solid or semi-solid matrices.
- **Smart Software**
  Simple method editing, programmed run; Intutive interface, ONE touch to process; 10-inch built-in touch screen, space saver.
- **Safe Protection**
  Protection measures for over pressurized and heated as well as leakages; Compact structure, sealed design, with active exhaust system; Full log records and monitoring, alarm reminder for any method errors.

Parameter:

Pump pressure range	: Atmospheric pressure to 200bar(20MPa)
Temperature range	: Room temperature to 200°C (±1°C)
Extraction cell	: 11mL, 22mL, 34mL
Software interface	: 10-inch built-in screen
Power supply	: 200 to 240V, 50/60Hz
Operating temperature	: 10 to 40°C
Operating humidity	: 20 to 80%
Dimension	: 72cm x 56cm x 77cm; 120kg

Application Fields:

Food	Environmental	Other fields
Pesticide residues in food/food additives	Soil/hazardous residues and pesticides in solid waste/herbicides	Polymers, medicines, petrochemicals., etc

AH series

Automated Homogenizer

With the development of food safety and bio-medicine, automated homogenizers are more and more widely used in the sample pre-treatment of pesticide and veterinary drug residue detection to agricultural and livestock products, meat, eggs and milk.
RayKol AH 50 is a versatile and high throughput automated homogenizer, it completely replaces manual process of adding solvent and homogenization.It can process up to 36 samples at one time, greatly improving the efficiency of sample pre-treatment.

Features:

- **Automatic, High throughput, Low residue**
  The entire homogenization process is fully automated, includes solvent adding and cutter cleaning, allows unattended operation. Large batch processing capacity, up to 36 samples in one batch. Various probe-rinsing modes can be combined freely to minimize the possibility of cross contamination.
- **Good compatibility**
  Different kinds of sample tube racks available and flexible for various applications. Also compatible with common centrifuge vials.
- **Safe and reliable**
  Built-in safety alarm for any abnormal condition such as cutter miss-position, motor overheat and sample overload.
- **Easy to operate**
  Graphical software interface, easy for experienced and novice users.

Parameter:

Power rating	: 600 Watts
Speed control	: 3,000 to 25,000rpm
Generator probes	: 10mm × 108mm, 19mm × 204mm
Sample tube range	: 15mL, 50mL, 100mL, 120mL, 200mL
Carousel rack range	: 12, 16, 24, 36 positions; aluminum alloy, plastic
Oscillation mode	: Up-and-down vertical motion
Software interface	: 10 inch built-in monitor screen control
Dimension	: 57cm x 40cm x 78cm
Power	: 600W

Application Fields:

Can be used for a variety of samples. Samples with high moisture content, high fat content, high fibre content.

V20

Vertical Oscillator

Raykol V20 vertical oscillator can be used for rapid oscillation and mixing of samples, cell disruption, tissue homogenization. It has a high speed and large throughput, capable of processing 576 samples in a single batch. It can handle a wide range of samples, including plant roots, stems, leaves, flowers, fruits, seeds and animal tissues, and can also meet the requirements for sample extraction in QuEChERS pre-treatment methods.

Features:

- **High throughput**
  Up to 576 samples can be processed in one batch.
- **High safety**
  Utilize electronic lock, open the door will automatically stop running, to ensure the safety of personnel.
- **Simple operation**
  Color touch screen displaying oscillation speed and time; With start and stop buttons, it can be stopped and started at any time during the oscillation process. Also available for appointed and looped operation.
- **Good viewing windows**
  Transparent viewing window with built-in LED light allows user to observe the sampling situation at any time.
- **Flexible application**
  Available in various sizes of sample racks to meet different applications, compatible with 15mL, 50mL, 100mL centrifuge vials.

Parameter:

Sample capacity : 20, 38, 10, 54
Sample vial : 15mL, 50mL, 100mL centrifuge vials; 2mL cyogenic vials
Shaking rate : 500 to 1800rpm, adjustable
Amplitube : 32mm
Software control : 7-inch built-in touch screen
Dimension : 37cm x 52cm x 69cm

Application Fields:

Food Safety, Rapid sample processing, Life Science.

MTV 3000

Multi-Tube Vortex Mixer

As an ideal mixer for large sample batches, RayKol MTV 3000 is mainly used for vortex mixing up to 66 samples (using 2mL EP tubes) at a time, in great effect and efficiency. It can accommodate a wide variety of vials with different sponge racks. MTV 3000 can be widely used in molecular biology, cell biology, chemicals, pharmaceuticals, and food industries.

High throughput, wide application range, and simple operation:

- 7-inch color touch screen control, real-time display of the current rate and remaining time.
- Appointment start, cycle setting, multiple steps of different rate and duration.
- Available in 3 modes for operation for various sample matrices.
- High throughput, can process up to 66 samples simultaneously.
- Compatible with 100 mL, 50 mL and 15 mL vials, also available in customized racks.

Parameter:

Sample capacity: 50, 18, 15,66
Sample vial : 15mL, 50mL, 100mL centrifuge vial; 2mL EP vial
Shaking rate : 500 to 3000rpm, adjustable
Software control: 7-inch built-in touch screen
Dimension : 40cm x 31cm x 52cm; 25kg
Power : 150W

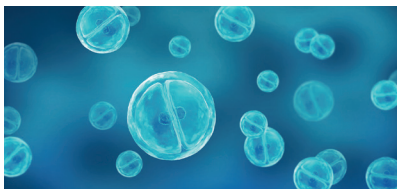
Application Fields:

QuEChERS method

For extracting pesticides, antibiotics, drugs

Molecular biology

Used in PCR and DNA extraction for mixing reagents



Cell biology

Used in cell culture for mixing

AP 300

Automated Liquid Handling Station

Nowadays, the handling of aqueous samples in laboratories is becoming more frequent. Lab technicians often need to perform steps such as sample transfer, standard calibration curve preparation, internal standard addition, and solvent dispensing. However, errors such as leakage, or incorrect addition can have a significant adverse effect on the accuracy of the experimental process and results. The above processes require the lab technicians´ utmost concentration to obtain reliable experimental results. RayKol AP 300 Automated Liquid Handling Station, which frees the lab techni cians from the tedious process of sample preparation and protects their physical and mental health. At the same time, the system covers functions such as sample registration, preparation and experimental data recording, provid ing customers with a comprehensive experience in liquid sample handling.

Features:

- **Dual Mode**
  Available in sampling needle, puncture sampling needle. For headspace vials containing volatile solvents, the puncturing needle
- module can be used for precise and convenient microsampling of the sample liquid.
  Sample Rack
  The sample rack is equipped with a cooling and heating function, which allows for the control of the sample at an appropriate
- temperature. It integrates an oscillation & mixing function, which enables quick and accurate mixing of intermediate solution, to enhance the accuracy and convenience of the preparation process. Compatible with common glass tubes available on the market, such as 2mL GC vials, 10mL and 20mL headspace vials, and 15mL and 50mL centrifuge tubes.
- **High precision**
  Using a high-precision syringe to achieve the transfer of minute liquid samples. The syringe works in collaboration to enable dilution in a range of up to 10,000 times.
  Multi-function
  It can achieve complex processes such as standard calibration curve preparation, mixed standard preparation, and fixed standard preparation, meeting the needs of liquid dispensing operations in the laboratory with common volumes ranging from 5μL to 100mL.

Parameter:

Triple Syringe pump : 100μL, 1000μL, 10mL for organic; 250μL, 2500μL, 25mL for inorganic
Sample rack : available in 4 racks
Sample vial : 2mL chromatography vials, 20/30/40mL headspace bottle, 15/50mL centrifuge vials
Dispensing range : 10 to 1000μL for organic; 25 to 2500μL for inorganic
Software control : PC control, WIFI connection

Application Fields:

It can be used to prepare standard calibration curves for a variety of analysis.



Detection of Perfluorinated Compounds in Drinking Water Sample Pre-treatment Solution

Since their production began in the 1950s, perfluorinated compounds (PFCs), serving as surfactants and protective agents, have been widely used in industrial manufacturing and everyday items, such as carpets, leather, floor wax, etc. PFCs are characterized by their high toxicity, persistence, bioaccumulation, and the ability to migrate over long distances, similar to persistent organic pollutants. In 2009, the Stockholm Convention classified perfluorooctane sulfonic acid (PFOS) and its salts as persistent organic pollutants. On June 2 of this year, the Chinese Ministry of Ecology and Environment emphasized at its regular press conference in May that persistent organic pollutants would be included in the national environmental monitoring system. The recently released Outline of Ecological Environment Monitoring Planning (2020-2035) by Ministry of Ecology and Environment also highlighted the importance of enhancing the monitoring capabilities and levels for persistent organic pollutants.
PFCs in domestic wastewater are discharged into the environment through sewage treatment plants and enter the environment and organisms through water, soil, air and other media. Since drinking water is one of the main routes through which the population is exposed to PFCs, simultaneous determination of various PFCs, especially short-chain (carbon number < 8) and medium-long chain (8 ⩽ carbon number ⩽ 10) PFCs in drinking water is very necessary for ensuring the safety of drinking water.

Methods for Detecting Perfluorinated Compounds	Gas Chromatography-Mass Spectrometry Capillary Electrophoresis Liquid Chromatography-Mass Spectrometry Ultra-Performance Liquid Chromatography Tandem Mass Spectrometry
Main Pre-treatment Methods for Perfluorinated Compounds	Solid Phase Extraction

Solid Phase Extraction has the advantages of simple operation, low solvent consumption, fewer analytical steps and time, and a wide range of applicability.
Raykol offers automated sample pre-treatment solutions for the analysis of PFCs in drinking water. By incorporating automated pre-treatment equipment into the entire testing process, Raykol assists laboratory personnel in rapidly and pollution-freely pre-treating drinking water samples for PFC testing, ensuring fast, efficient and accurate detection.

Instruments, Reagents and Consumables

Instrument	Reagent	Consumable
Raykol Fotector Plus High Throughput Fully Automatic Solid Phase Extraction Instrument	Methanol, Ammonium Acetate (HPLC-MS grade)	0.22 μm Acetate Cellulose Filter Membrane
Raykol Auto EVA 80 Automated Evaporation System		
Waters ACQUITY UPLC-XEVO Micro TQS Ultra High Pressure Liquid Chromatography - Tandem Mass Spectrometer	Ammonia Water (HPLC-MS grade)	Oasis WAX Solid Phase Extraction Column (150 mg, 6 mL)
Ultrasonic Cleaning Machine		
Vortex Oscillator	Ammonium Acetate, Glacial Acetic Acid (Analytical grade)	Acquity UPLC™ BEH C18 Chromatography Column (1.7 μm, 2.1 mm × 50 mm)
Electronic Balance (sensitivity 0.0001g)		

Standard Substance:

Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPA), Perfluorohexanoic Acid (PFHxA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluorobutanesulfonic Acid (PFBS), Perfluorohexanesulfonic Acid (PFHxS), Perfluoroheptanesulfonic Acid (PFHpS), Perfluorooctanesulfonic Acid (PFOS), 13C2-Perfluorohexanoic Acid (MPFHxA), 13C4-Perfluorooctanoic Acid (MPFOA), 13C4-Perfluorooctanesulfonic Acid (MPFOS).

Pre-treatment Main Instrument Introduction

Fotector series Automated Solid Phase Extraction

Auto EVA 80 Automated Evaporation System

Detection Conditions

Ultra-High Performance Liquid Chromatography Conditions

BEH C18 column, column temperature 40°C, injection volume 10 μL, mobile phase A is methanol, mobile phase B is a 5 mmol/L aqueous solution of ammonium acetate, flow rate 0.3 mL/min, gradient elution program as per the table on the right.

Time/min	Mobile Phase A/%	Mobile Phase B/%
0.0	25	75
0.5	25	75
10.0	85	15
10.5	95	5
14.0	95	5
14.1	25	75
16.0	25	75

Mass Spectrometry Conditions

Ion source: Electrospray Ionization (ESI), negative ion scan, Multi-Reaction Monitoring (MRM) mode analysis. Source temperature: 150°C, desolvation temperature: 500°C, desolvation gas flow: 1000 L/h, collision gas flow: 50 L/h, capillary voltage: 2.0 kV. High-purity nitrogen is used for desolvation and nebulization, and the collision gas is argon.

Recovery Rate and Relative Standard Deviation of 11 PFCs in Water

Tap water samples were collected and spiked with three concentration levels (low: 5.00 ng/L, medium: 10.00 ng/L, high: 50.00 ng/L) of the 11 PFC standard substances. Six replicates were prepared for each concentration level. The recovery rates and relative standard deviations of the 11 PFCs at different concentration levels were calculated. The recovery rates of the 11 target compounds at the three concentration levels ranged from 90.0-122.0%, 87.1-130.0%, and 80.0-114.0%, with relative standard deviations of 2.0-8.6%, 1.3-9.1%, and 2.2-11.0%, respectively.

Target Compound	Background Concentration (ng/L)	Spiked Concentration (ng/L)	Mean (ng/L)	Standard Deviation	RSD (%)	Average Spiked Recovery Rate (%)
Perfluorobutanoic Acid	4.03	5.00	8.53	0.293	3.4	90.0
	4.03	10.00	13.30	0.169	1.3	92.3
	4.03	50.00	44.00	2.199	5.0	80.0
Perfluoropentanoic Acid	ND	5.00	5.36	0.242	4.5	107.0
	ND	10.00	9.54	0.488	5.1	95.4
	ND	50.00	52.50	1.800	3.4	105.0
Perfluorohexanoic Acid	1.50	5.00	6.46	0.126	2.0	99.1
	1.50	10.00	11.80	0.404	3.4	103.0
	1.50	50.00	48.10	1.041	2.2	93.1
Perfluoroheptanoic Acid	1.26	5.00	6.35	0.201	3.2	102.0
	1.26	10.00	11.70	0.531	4.5	105.0
	2.01	50.00	56.70	2.290	4.1	109.0
Perfluorooctanoic Acid	3.64	5.00	8.23	0.410	5.0	91.9
	3.64	10.00	12.90	0.675	5.2	92.6
	3.64	50.00	57.20	4.270	7.5	107.0
Perfluorononanoic Acid	1.86	5.00	7.30	0.232	3.2	109.0
	0.91	10.00	9.62	0.391	4.1	87.1
	1.86	50.00	49.90	2.540	5.1	96.0
Perfluorodecanoic Acid	ND	5.00	5.50	0.473	8.6	110.0
	ND	10.00	12.10	0.585	4.8	121.0
	ND	50.00	51.60	1.420	2.8	103.0
Perfluorobutanesulfonic Acid	ND	5.00	6.12	0.185	3.0	122.0
	ND	10.00	12.10	0.302	2.5	121.0
	ND	50.00	56.90	5.210	9.2	114.0
Perfluorohexanesulfonic Acid	ND	5.00	6.07	0.186	3.1	121.0
	ND	10.00	10.90	0.251	2.3	109.0
	ND	50.00	51.90	3.930	7.6	104.0
Perfluoroheptanesulfonic Acid	ND	5.00	6.04	0.449	7.4	121.0
	ND	10.00	13.00	1.180	9.1	130.0
	ND	50.00	56.20	5.900	11	112.0
Perfluorooctanesulfonic Acid	ND	5.00	5.66	0.202	3.6	113.0
	ND	10.00	11.30	0.818	7.3	113.0
	ND	50.00	55.10	2.800	5.1	110.0

Instrument Blank Inspection

To verify whether the Fotector Plus high-throughput fully automatic solid-phase extraction instrument introduces any target analyte residues or contaminants during the sample pretreatment process, two pure water blank samples were processed using the pretreatment method before starting the instrument and after the experiment ended. The results were determined by ultra-high performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS). The results showed that the target analytes were not detected in the blank samples processed at startup and in the blank samples processed after the actual samples, indicating that the instrument does not leave residues in the samples during processing and does not introduce contaminants.
The detection results are shown in the following table:

Target Compound	Start-up Blank		End-of-experiment Blank		Method Detection Limit (ng/L)
	Measured value1 (ng/L)	Measured value1 (ng/L)	Measured value1 (ng/L)	Measured value1 (ng/L)	
Perfluorobutanoic Acid	ND	ND	ND	ND	3.0
Perfluoropentanoic Acid	ND	ND	ND	ND	3.0
Perfluorohexanoic Acid	ND	ND	ND	ND	1.5
Perfluoroheptanoic Acid	ND	ND	ND	ND	0.5
Perfluorooctanoic Acid	ND	ND	ND	ND	1.5
Perfluorononanoic Acid	ND	ND	ND	ND	0.5
Perfluorodecanoic Acid	ND	ND	ND	ND	2.0
Perfluorobutanesulfonic Acid	ND	ND	ND	ND	2.0
Perfluorohexanesulfonic Acid	ND	ND	ND	ND	2.0
Perfluoroheptanesulfonic Acid	ND	ND	ND	ND	2.0
Perfluorooctanesulfonic Acid	ND	ND	ND	ND	2.0

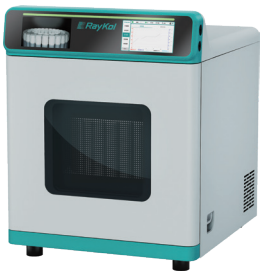
Experimental Conclusion

This scheme has established a solid-phase extraction-ultra-high performance liquid chromatography-tandem mass spectrometry method for the analysis of 11 perfluorinated compounds in drinking water. This method features a wide linear range, low detection and quantification limits, and its accuracy and precision are suitable for the simultaneous determination of various perfluorinated compounds in drinking water.
The pre-treatment purification process utilizes the Raykol Fotector Plus fully automatic solid-phase extraction instrument with a precise injection pump to control the volumes for activation and elution, ensuring stable and controllable flow rates for activation, elution, and sample loading. In conjunction, the Raykol Auto EVA 80 high-throughput fully automatic parallel concentrator is used for concentration. The sample racks of both instruments are compatible for use, making operations coherent and straightforward. The detection results have shown excellent recovery rates and RSD outcomes, and the blank determination confirmed that the pre-treatment process did not cause cross-contamination due to residual analysis targets in the instruments, thereby demonstrating that both pre-treatment instruments are suitable for the pre-treatment of perfluorinated compounds detection in drinking water.

XT series

Microwave Digestion Systems

Microwave digestion, as an efficient sample pretreatment method, can well maintain the integrity of the sample and has a high sample recovery rate in analysis and detection. The XT series of closed intelligent microwave digestion systems are developed based on a decade of experience in infrared temperature control technology in the microwave field. They are suitable for laboratory and various environments, with multiple safety protections and a wide range of applications.

			
XT Microwave	XT-9930	XT-iMD	XT-9910
Capacity for 55mL vessels	-	42	-
Capacity for 75mL vessels	42	42	-
Capacity for 100mL vessels	16	16	8
Sample loading	Top loaded	Front loaded	Front loaded
Microwave output	2,400 W Bottom fed	2,400 W Bottom fed	1,000 W Side fed
Cavity volume	75L industrial	65L industrial	35L industrial
Rotor detection	Automatically detect		
Temperature monitoring	Mid-infrared scanning to all vessels from the bottom		
Pressure monitoring	Contactless pressure sensor with automatic release mechanism		Explosion-proof membrane
Dimension	65 x 63 x 62 (cm); 70 kg	60 x 65 x 75.5 (cm); 70 kg	61 x 50 x 55 (cm); 40 kg

Application Fields:




Applicable to element analysis of foods, environment, agriculture, pharmaceuticals, cosmetics, textiles, geology, plastics, petrochemicals, battery manufacturing.

Hot Plate

Digestion System

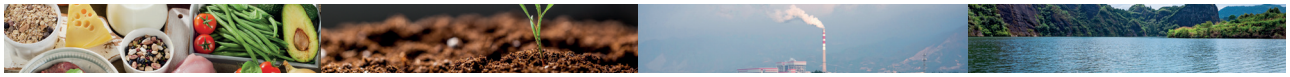
Features:

- High-density graphite with a maximum design temperature of 450°C. Graphite material ensures uniform temperature and minimal thermal shock.
- Aluminum alloy cast surface with precision finishing, maximum design temperature of 350°C, good thermal conductivity, uniform temperature, large effective heating area, and fast heating.
- The temperature control system uses a 5-inch color touchscreen, simplifying operation.
- Program input uses a tabular quick-input method, which is clear, fast, and reduces errors.
- Available in 0 to 40 steps program for setting and selecting.
- Dual modes available: single-point heating and temperature curve heating.
- Smart PID self-tuning provides high, reliable, and stable temperature control accuracy.
- The electrical control system utilizes solid-state relays, ensuring quiet operation and strong anti-interference ability.
- Segmented power supply and anti-power-failure restart functions minimize potential risks.

				
Model	HE G460	RB-400S	RB-600L	RB-400L
Worktop Size(mm)	600x400	380x290	600x400	380x290
Worktop Material	High-Density Graphite		Aluminum Alloy with Coating	
Design Temperature	450°C	450°C	350°C	
Temperature Accuracy	±1°C			
Temperature Control System	eparate control module, Single-Point Heating	5-inch Color Touchscreen, 0-40 Steps Heating/Single-Point Heating Dual Mode		

Application Fields:

Lab hot plate can handle sample heating, digestion, boiling, acid steaming, temperature maintaining, baking and other experimental processes.It meets the needs of chemical laboratories in various industries such as physics, chemistry, biology, environmental protection, pharmaceuticals, food, beverages, scientific research for reagent heating. It can be widely used in agricultural product testing, soil testing, environmental protection, hydrological monitoring, and is suitable for vocational colleges, industrial and mining enterprises, research institutes and other institutions.



AP 210

Automated Acid-Adding System

Concentrated acid is a common solution used in various inorganic element analysis and conventional physicochemical analysis. The work of manual acid adding is repetitive and time-consuming, long-term contact and exposure to analysts and lab environment could cause damage and pollution.

RayKol AP210 Automated Acid-adding System utilizes double peristaltic pumps and different calibration modes to ensure accuracy and precision in dispensing; its fully anti-corrosive unit could help with the safety of lab environment, be an effective solution for conventional acid adding.

Features:

- **Smart acid-adding**
  High-precision peristaltic pump, to process continuously; Double-pump design, max. flow of single pump could be 4mL/s, can select synchronous liquid addition to improve flow rate; Two calibration modes, to ensure precision and accuracy. Available in 8 reagent channels, can switch any reagent as user defined.
- **Flexible to various applications**
  Compatible with various size of digestion vessels; Large sample capacity, max. 48 samples.
- **Safety**
  Remote control via PC or tablet, WIFI connected, maintain safe distance from acid. Full anti-corrosive coating to entire unit with anti-corrosive 3-axis mechanical arm, for well preservation of the equipment. Standard anti-corrosion blower, to avoid residual acid fume. HEPA filter, to avoid sample contamination.
- **Control software**
  Graphical software interface, can select sample position, easy to use. Able to set and adjust any parameters for method modification.

Parameter:

Sample capacity	: max. 48
Sample vials	: digestion vessels, crucibles, glass tubes
Reagent channel	: 8
Dispensing range	: 0.5 to 4mL/s, adjustable
Reagent tubing	: PTFE material
Software	: PC/tablet; WIFI connection
Dimension	: 54cm x 52cm x 67cm; 40kg
Power	: 200W

Application Fields:

Food, agricultural products, environment (soil, solid waste, water quality), cosmetics, textiles, medicines, geology, mining.

Lab Consumables

Committed to building a professional consumables service platform, RayKol Group is dedicated to providing customers with sample pretreatment equipment, equipment accessories and related lab consumables, focusing on supplying consumables from well-known brands. The main products include instrument accessories and consumables for sample preparation equipment and analytical instruments, laboratory general equipment, standards and other scientific research supplies. Users are widely distributed in government agencies (customs, quality inspection, agricultural inspection, drug inspection, disease control, environmental supervision, public security, water affairs), universities, third-party laboratories, scientific research institutes and private sectors of food, pharmaceutical, chemical, biological engineering. We are committed to bringing an immediate and efficient "one-stop" service experience during testing and inspection for the users.

RayCure QuEChERS

- Utilize high-quality absorbents for efficient clean-up.
- Utilize high-quality centrifuge vials for good sealing and corrosion resistant.
- Economical solutions.
- Available in customization for method development and optimization.

RayCure SPE

- SPE cartridges with high-quality packing.
- A variety of silica based, polymer based, inorganic based cartrigdes .
- Quality control, to ensure recovery rate and reproducilibity.
- High performance and economical.

RayCure m-PFC Cartridges for Tea

- Directly absorb impurities.
- Simple and efficient, no centrifugation.
- With multi-walled carbon nanotubes for improved clean-up effect.
- Less time and solvent consumption.
- Improved sensitivity and stable method after clean-up.

Mycotoxin Immuno-affinity SPE Cartriges

- Utilize monoclonal antibodies for complete purification.
- Recovery rate ⩾90%.
- Applicable for detection of complex samples.
- Can be used for the detection of common toxins such as aflatoxin B1, vomitoxin, zearalenone, aflatoxin M1, total aflatoxin, ochratoxin A.

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RayKol Instrument Group

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