

Leading Global Provider of LAB EHS Solutions

What Is Lab EHS and Why Do We Need It?

EHS

Environment, Health, Safety

Environment, Health and Safety is a field that implements safety and environmental policies at work. The scope of EHS includes procedures for identifying and controlling safety hazards as well as accident prevention, and seeks to reduce overall risk to people by developing safe and environmentally friendly work practices.

The Importance of Lab EHS

Laboratories are dangerous environments and researchers, the vanguard of scientific and technological development, are at high risk of accidents and exposure to harmful chemical substances. Implementing integrated EHS management systems protect researchers, ensure their long-term safety, and guarantee a pleasant, environmentally-friendly work environment. Implementing these systems can also boost operational efficiency and reduce safety violations.

Lab EHS Management



Exposure to dangerous, toxic chemicals and gases



Difficult to identify risk and predict outcomes



Accidents mostly resulting from human error or negligence



Complaints from neighboring facilities and local communities

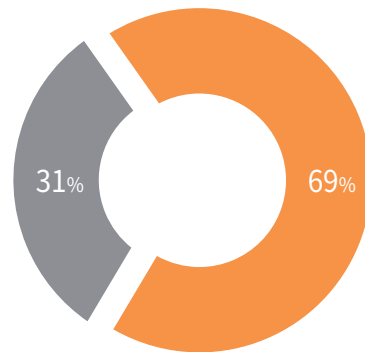
Major Laboratory Risk Factors



Chemical Hazard



Human Error



Source : A Study on the Analysis and Management of Types of Laboratory Accidents (2018)

Ignore

Long-term Downside Risk of Laboratory Accidents



Brain drain as employees move to other safer fields



Economic loss due to poor performance and regulatory penalties



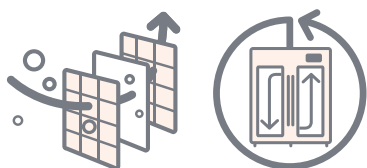
Reduced out put as researchers are unable to provide results in dangerous environments



Social loss and loss of human life caused by laboratory accidents and chronic diseases caused by long-term exposure to harmful chemicals

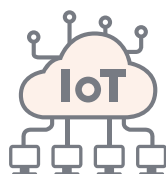
Our Solutions

Lab EHS is a comprehensive issue requiring integrated, preemptive solutions that fully take into account and consider the unique aspects and characteristics of the laboratory environment in order to effectively minimize accidents, ensure the health and safety of lab researchers and minimize potential socioeconomic losses, thereby establishing a sustainable R&D environment.



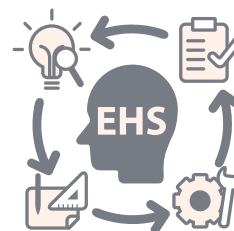
TOGA® CLEAN SYSTEM

Eliminate toxic gases from the laboratory environment. Keep researchers safe, protect the environment and reduce energy consumption.



IoT EHS Platform

Prevent accidents and boost operation efficiency

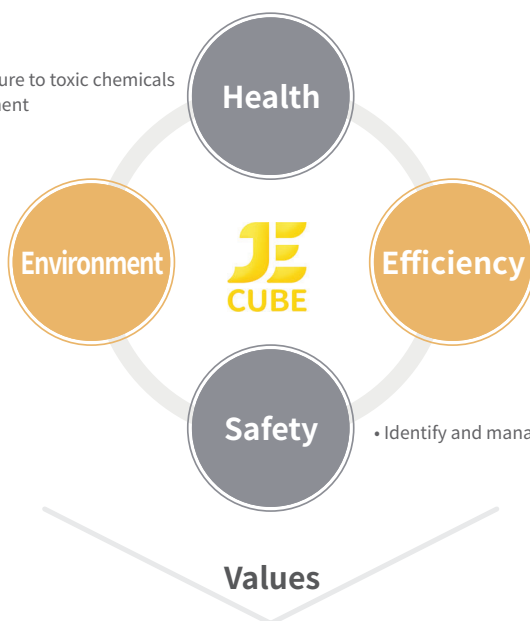


Lab EHS Total Solution

One-stop lab EHS consulting, design, and customized solutions

- Prevent diseases caused by exposure to toxic chemicals
- Provide a pleasant work environment

- Prevent environmental pollution
- Reduce energy costs



- Promote communication
- Quick and easy installation, convenient portability

- Identify and manage risk factors in real time

Benefits of a Lab EHS-based Approach



Provide a safe and healthy working environment



Boost user productivity and sustainability



Fulfill our social responsibility and promote environmental conservation

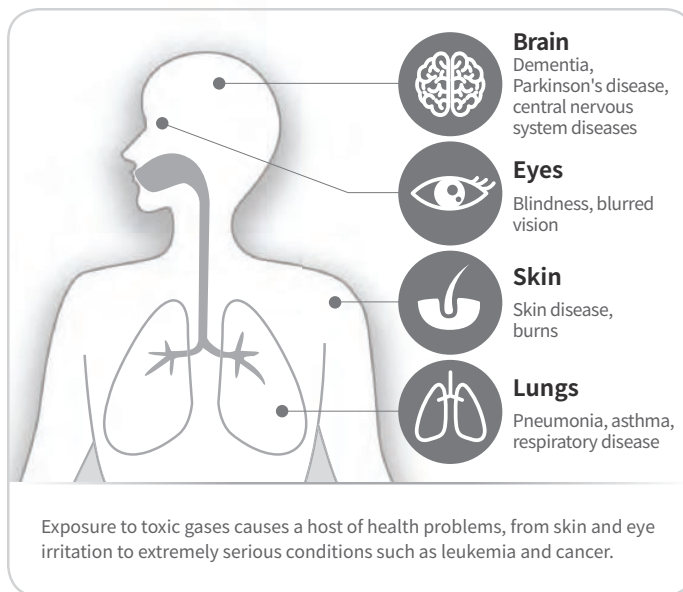
The Dangers of Laboratory Chemicals

Most common chemicals used in the lab are toxic and exposure can cause serious harm. Volatile chemicals, which produce gaseous vapors at room temperature, need to be properly stored and managed as these vapors can cause harm even when they are not being used in laboratory experimentation.



When You Handle Chemicals, Remember :

- Always check MSDS when handling chemicals.
- Be well-informed of what to do when exposed to harmful chemicals.
- Wear protective equipment whenever you handle chemical substances.



Diseases Resulting from Chemical Exposure

Long-term exposure to chemicals may cause bodily harm and disease. The below list shows some of the most common chemicals used in laboratories and the effects exposure to these chemicals has on the human body.

Substance	Chemical formula	TLV-TWA	TLV-STEL	Diseases Caused by Exposure
Chloroform (Trichloromethane)	CHCl_3	10 ppm	-	Skin disease, toxic hepatitis
Benzene	C_6H_6	0.5 ppm	2.5 ppm	Anemia, leukemia
Trichloroethylene	CCl_2CHCl	10 ppm	25 ppm	Skin disease, toxic hepatitis, renal cancer
Formaldehyde	HCHO	0.1 ppm	0.3 ppm	Asthma, paranasal sinus and nasal cavity cancer, leukemia
Lead	Pb	50 $\mu\text{g}/\text{m}^3$	-	Anemia, peripheral neuritis, nephritis
Nickel (soluble compounds)	Ni	100 $\mu\text{g}/\text{m}^3$	-	Dermatitis, lung cancer, paranasal sinus, & nasal cavity cancer
Cadmium	Cd/CdO	10 $\mu\text{g}/\text{m}^3$	-	Kidney disease, lung cancer
Chromium (IV) compounds (water-soluble)	Cr	50 $\mu\text{g}/\text{m}^3$	-	Dermatitis, respiratory system damage, lung cancer
Sulfuric acid	H_2SO_4	200 $\mu\text{g}/\text{m}^3$	-	Chronic bronchitis, laryngeal cancer
Ethylene oxide (EO gas)	$(\text{CH}_2)_2\text{O}$	1 ppm	5 ppm	Leukemia, cataracts
Dimethylformamide (DMF)	$\text{HCON}(\text{CH}_3)_2$	10 ppm	-	Dermatitis, toxic hepatitis
Ozone	O_3	0.05 ppm	-	Pulmonary edema, respiratory system damage
Hydrogen peroxide	H_2O_2	1 ppm	-	Pulmonary edema, emphysema

- ▶ TLV (Threshold Limit Values) : Permissible concentration of exposure to chemicals
- ▶ TLV-TWA (Time-Weighted Average) : Concentration at which a worker is deemed not affected when he/she works for 8 hours a day, 40 hours a week
- ▶ TLV-STEL (Short-Term Exposure Limit) : Maximum concentration at which a worker can be exposed for 15 consecutive minutes

Importance of Safe Reagent Storage

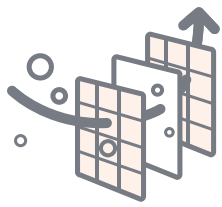
The safe storage of hazardous chemicals is a major component of proper lab EHS management. To be considered safe, standards set by OSHA in the United States and EHSA in Europe, as well as those set by other major and local regulatory bodies must be met. Chemicals must be properly labeled and segregated according to their hazard class. Accidental exposure between incompatible chemicals can cause fire, explosion and other dangerous reactions, which can cause accidents and bodily harm.



Categorizing Chemical Substances by Hazard Class

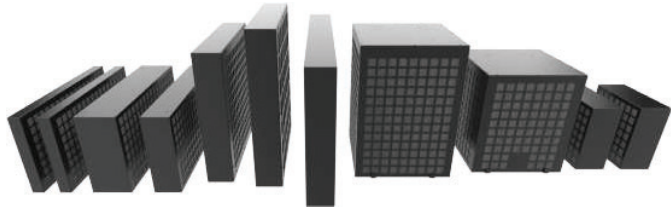
Categorization by property	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Properties	Oxidizing solid	Flammable solid	Water-reactive chemicals and Pyrophoric substances	Combustible liquids	Self-reactive substances	Oxidizing liquids
Group 1	-	X	X	X	X	O
Group 2	X	-	X	O	O	X
Group 3	X	X	-	O	X	X
Group 4	X	O	O	-	O	X
Group 5	X	O	X	O	-	X
Group 6	O	X	X	X	X	-

SOLUTION 1 : TOGA® CLEAN SYSTEM



TOGA® Filter Technology

- Patent in the US : US 8, 845, 971, B2
- Patent in ROK : No. 10-0941666
- Patent in China : No. 1345867



The Best Filter for Removing Toxic Gases

TOGA® filters use laboratory-optimized Triple Action Technology™ that combines physical adsorption with chemical and neutralization reactions to eliminate virtually all toxic gases.



VS



- Removes toxic gases and odors through physical adsorption.
- Removes toxic gases through chemical reactions
- Removes toxic gases through neutralization



Removes over 99% of various toxic gases from the laboratory



Works at high efficiency longer, with less frequent filter replacements required



Minimize risk of contamination from filter saturation

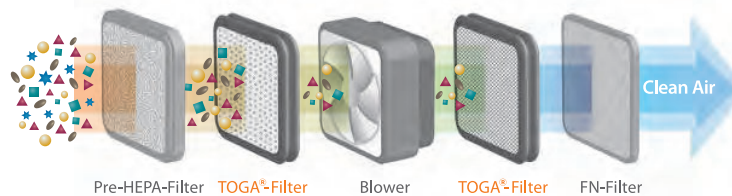
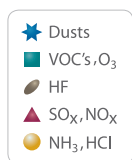


No ozone or harmful substances are created as byproducts

Filter Selection Guide

A type	B type	C type
VOCs, alcohol, hydrocarbon, odors	Organic compounds, O ₃ , NH ₃	Acid, bases, NO _x , SO _x
STANDARD type	SPECIAL type	
Combination of A, B and C types for general laboratory use	Customized filter solutions designed for unique chemical applications	

TOGA® Clean System: How it Works



Toxic gases **1** → **2** → **3** → **4** Purified air

Step 1 (Pre-HEPA-filter)

Removes fine dust particles, extending filter life

Step 2 (TOGA® filter)

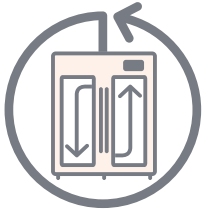
Removes toxic gases, VOCs, odors, fumes, etc.

Step 3 (TOGA® filter)

Boosts chemical removal efficiency, ensures safety by minimizing breakthrough

Step 4 (FN filter)

Removes the small amount of CO₂ generated while toxic gases are purified by the filter



Ductless Structure Design

Reinforces JE CUBE's core EHS mission by saving energy and protecting laboratory researchers from accidental exposure to fumes from stored chemicals

Closed Air Circulation in TOGA Products

- Prevents toxic gases generated by volatile chemicals from being released into the laboratory environment
- Extends filter life as the filter does not have to continuously purify external air flowing into the system



Average Filtered Storage Cabinets

Air is continually cycled through the filter and released into external lab environment.



TOGA® Filtered Storage Cabinets

Internal air is purified and recirculated ensuring safety and extending filter life

Benefits of Ductless Structural Design



Prevent Pollution

No pollutants are released into the outside environment



Energy Saving

Prevents energy loss, making it cheaper and easier to maintain laboratory temperature/humidity levels

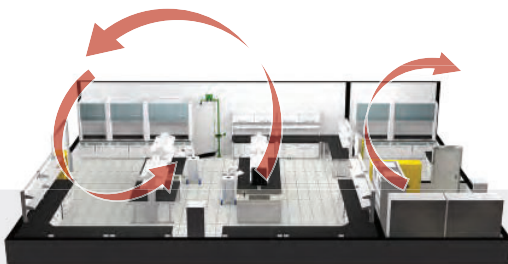


Enhanced Convenience

Easy to move and no need to connect to ductwork or HVAC system

Minimize Exposure to Toxic Chemicals

- Incorporate ductless structural design principles and toxic gas filtration technologies
- Reduce the energy costs required to maintain constant temperature and humidity conditions and minimize toxic gas being exhausted into external environment



Average Laboratory Environment

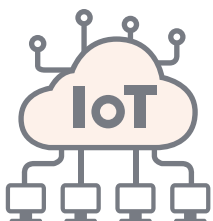
Air must be ventilated outside the laboratory via ductwork and HVAC system



Laboratory Environment Incorporating TOGA Ductless Structural Design

Minimize dependence on ductwork, reduce costs and provide a pleasant work environment while keeping researchers safe and healthy

SOLUTION 2 : IoT EHS Platform



Reagent Safety Prevention Management System (RSPMS)

Our IoT reagent management platform boosts reagent management efficiency and prevent human errors from occurring while handling potentially dangerous chemicals.



Safe Chemical Storage

- Automatic classification by hazard class
- Keep track of expiration dates
- Monitor reagent usage in real-time



Integrated Reagent Management

- Database of over 20,000 reagents
- RFID technology to log reagent usage
- Reduce costs, boost efficiency



User Management

- Control user access to dangerous chemicals
- Independent system management by organization / team



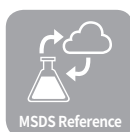
User-centered Interface

- Remote monitoring via web and mobile applications
- Push notifications for reagent and reagent storage conditions



Laboratory Safety Prevention Management System (LSPMS)

Integrated laboratory management solution providing a variety of safety and convenience features required for managing a safe lab environment, and complying with legal regulations related to laboratory safety and environment.



Digital MSDS

- Instant digital MSDS look-up
- Full RSPMS integration



Lab Air Quality Monitoring

- Monitor toxic gases and air quality in real time
- Push notification sent if contaminants exceed safe levels



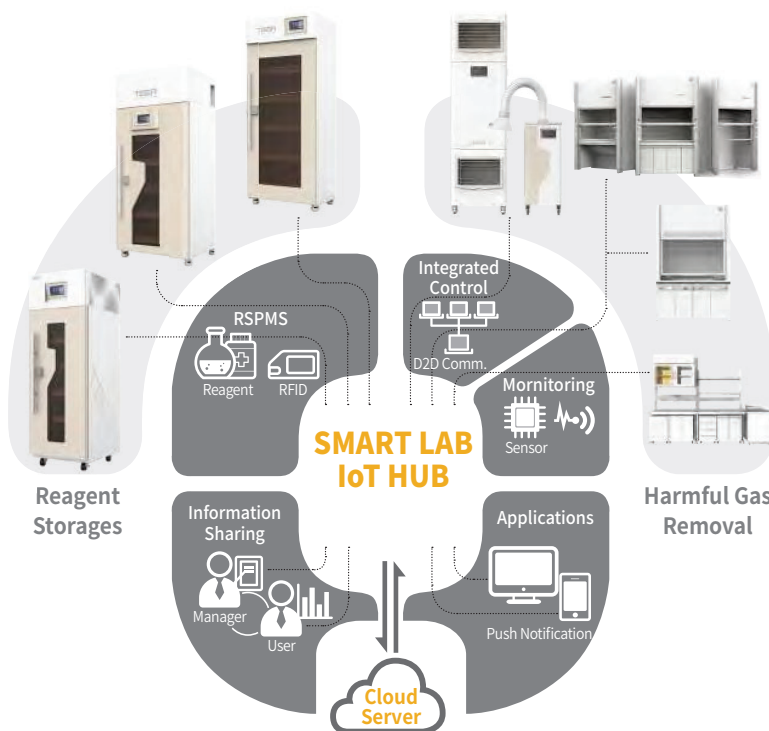
Experiment information sharing platform

- Data sharing between users, including safety regulations, notices, and experimental notes

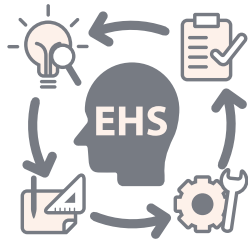


User-centered interface

- User-friendly mobile and web applications

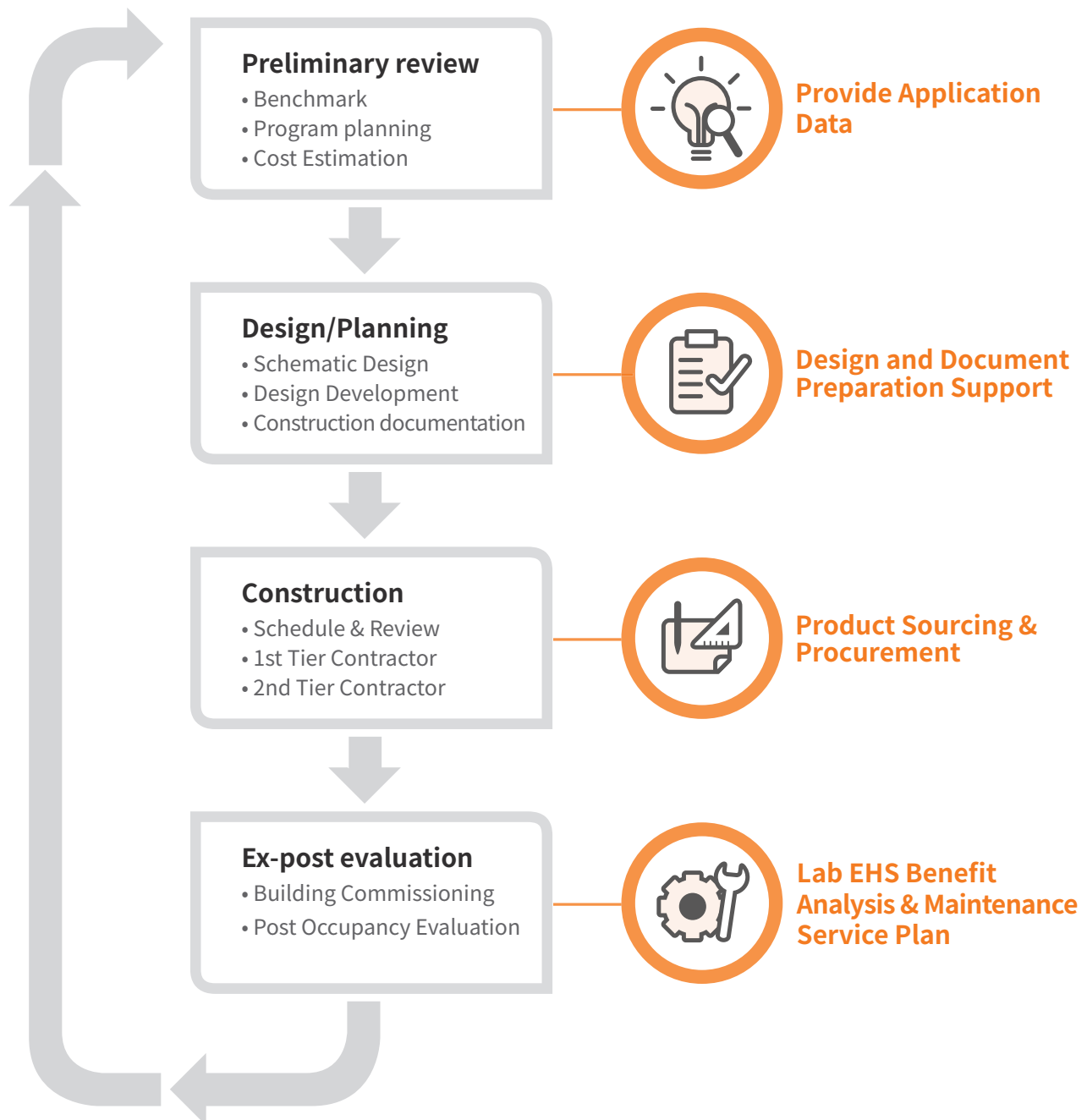


SOLUTION 3 : Lab EHS Total Solution











Turnkey Solutions for Lab Construction/Renovation

Our laboratory construction experts provide consulting and customized solutions to transform your laboratory into an EHS-optimized workspace, ensuring full compliance with all safety regulations and guaranteeing a safe, pleasant work environment for laboratory researchers.



PRODUCT Line-up

● Reagent Storage Cabinets

 <p>Completely Closed IoT Reagent Storage Cabinet (Double-Door)</p>	 <p>Completely Closed IoT Reagent Storage Cabinet (Single-Door)</p>	 <p>Completely Closed Reagent Storage Cabinet (Double-Door)</p>	 <p>Completely Closed Reagent Storage Cabinet (Single-Door)</p>
 <p>Exhaust-Type IoT Reagent Storage Cabinet (Double-Door)</p>	 <p>Exhaust-Type IoT Reagent Storage Cabinet (Single-Door)</p>	 <p>Exhaust-Type Reagent Storage Cabinet (Double-Door)</p>	 <p>Exhaust-Type Reagent Storage Cabinet (Single-Door)</p>

● Reagent Refrigerators

 <p>Premium Completely Closed IoT Reagent Refrigerator</p>	 <p>Premium Completely Closed Reagent Refrigerator</p>
 <p>Completely Closed IoT Reagent Refrigerator (Double-Door)</p>	 <p>Completely Closed IoT Reagent Refrigerator (Single-Door)</p>
 <p>Completely Closed Reagent Refrigerator (Double-Door)</p>	 <p>Completely Closed Reagent Refrigerator (Single-Door)</p>

● Intelligent Toxic Gas Purifiers

 <p>Standing Toxic Gas Purifier</p>	 <p>Portable Toxic Gas Purifier</p>
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● Ductless Fume Hoods

 <p>Intelligent Ductless Fume Hood</p>
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● Chemical Absorbent and Neutralizer Agent

 <p>TOGUARD</p>
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● Customized Equipment

 <p>Osmium Gas Purification System (All-in-One)</p>	 <p>Osmium Gas Purification System (Half-Type)</p>
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● Fume Hood



Aluminum All-in-One



Aluminum Upper Type



Aluminum Walk-In



Aluminum Tabletop



Steel Fume Hood

● Laboratory Furniture



Intelligent Laboratory Table System



Tabletop Reagent Storage



Ventilated Laboratory Table with Shelf



Ventilated Laboratory Table



Center Type Laboratory Table with Shelf



Center Type Laboratory Table



Wall Laboratory Table with Shelf



Wall Plane Laboratory Table



Laboratory Sink Table



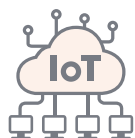
Drawer



Cabinet



Corner Laboratory Table



Toxic Gas Removal



Longer Filter Life



Minimize Filter Breakthrough



No Harmful Byproducts



Environmental Protection



Energy Saving



Enhanced Convenience



Safety Management



Integrated Reagent Management



Access Management



Instant MSDS Look-up



Air Quality Monitoring



Information Sharing



User-centered I/F

※ Specifications are subject to change at any time without prior notice.