

# Presentation for Environmental Testing Instrument



8<sup>th</sup> March 2025

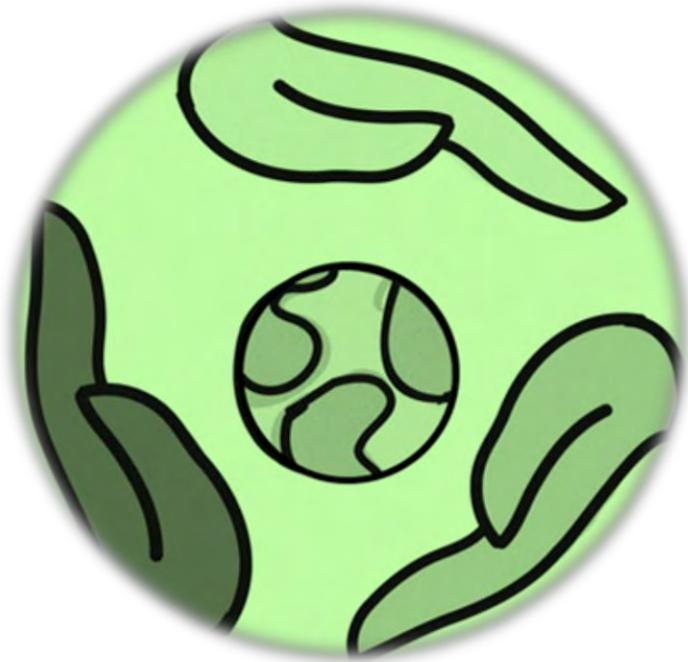


MES

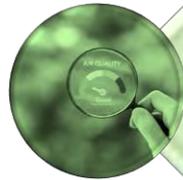


Trust, only one you can find here.  
**Amigos**  
International Co., Ltd.

# AGENDA



**Water Quality Testing Instruments**



**Air Quality Monitoring Instruments**

# What is basic water quality?

- Chemical
- Physical
- Biological





## Physical Parameter

- Color
- Taste
- Odor
- Temperature
- Turbidity
- Solid
- Electrical Conductivity



## Chemical Parameter

- pH
- ORP
- Acidity
- Alkalinity
- Chlorine
- Hardness
- Dissolved Oxygen
- Biological Oxygen Demand



## Biological Parameter

- Bacteria
- Algae
- Viruses

# PHYSICAL PARAMETER

Physical parameters are numerical values that describe the size, energy output, and other characteristics of an object or system. These parameters can be used to measure the strength of magnetic fields, temperatures, and densities





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## Color

Color in water may result from a variety of sources including natural metallic ions (iron and manganese), humus and peat materials, plankton, weeds, and industrial wastes.

True color is measured after a sample of water has been collected and purified (either by centrifuging or filtration). Pure water tends to look cyan in color and a sample can be compared to pure water with a predetermined color standard or comparing the results of a spectrophotometer.



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## Taste

Taste in water can be caused by foreign matter, such as organic compounds, inorganic salts or dissolved gases. These materials may come from domestic, agricultural or natural sources.



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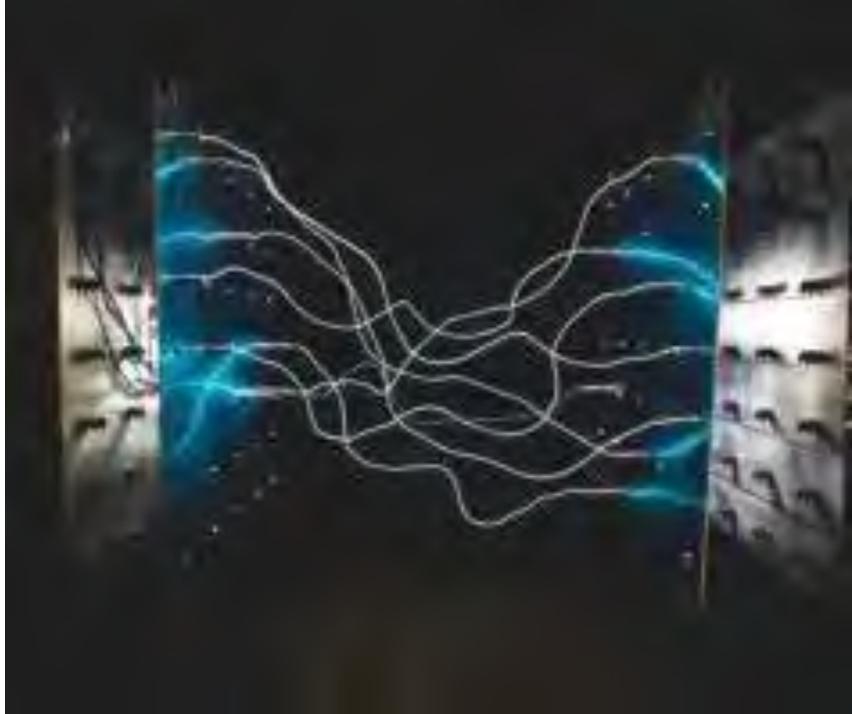
## Odor

Musty, Moldy, Earthy, Grassy or Fishy Odor. Although these odors are harmless, the human senses of taste and smell are extremely sensitive even at a very low level. These kinds of odors may be due to: Decaying organic matter in the drain. Pollution of well water from surface drainage.



## Turbidity

Turbidity is a measure of water clarity. High turbidity makes the water appear cloudy or muddy. Why do we measure turbidity? Turbidity and total suspended solids (TSS) are different ways to measure similar water quality characteristics.



## Temperature

Water temperature is a measure of the kinetic energy of water and is expressed in degrees Fahrenheit (F) or Celsius (C). Water temperature varies according to season, depth, and, in some cases, time of day.



## Electrical Conductivity

Electrical conductivity measures the ability of water to conduct an electrical current. The higher the concentration of dissolved charged chemicals (also known as salts) in the water, the greater the electrical current that can be conducted.

# CHEMICAL PARAMETER

Chemical parameters include pH, acidity, alkalinity, anions such as chlorides, sulfates fluorides, nitrates, hardness, metals such as iron, manganese, copper, and zinc, BOD, COD, and other toxic inorganic and organic substances. Reactions in living organisms are only possible within a restricted range of pH.





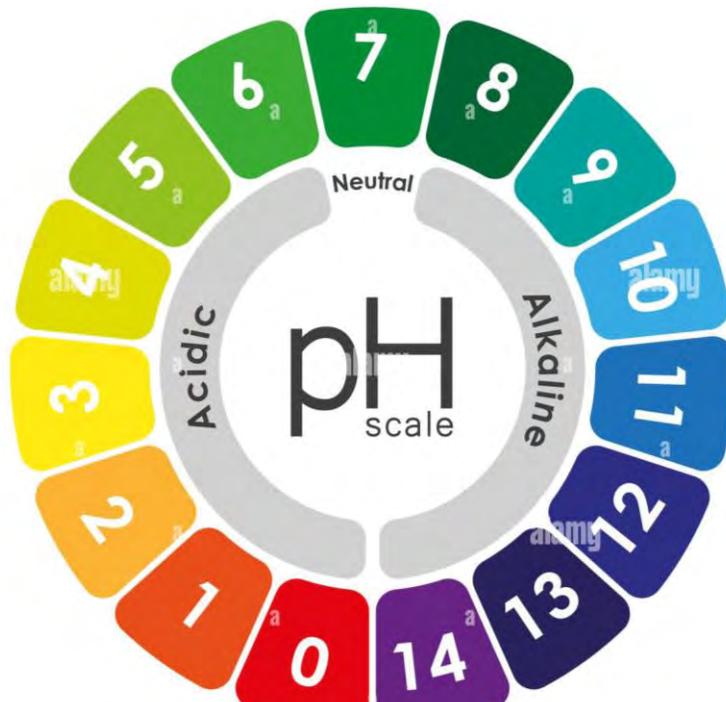
## Acidity & Alkalinity

More precisely, acidity and alkalinity are defined as a water's capacity to neutralize strong bases or acids, respectively. The term “acidic” for pH values below 7 does not imply that the water has no alkalinity; likewise, the term “alkaline” for pH values above 7 does not imply that the water has no acidity.



## pH/ORP

pH measures the concentration of hydrogen ions in water, providing a direct measure of how acidic or alkaline the water is. ORP measures the electrical potential needed to transfer electrons among participants in a chemical reaction, indicating the oxidizing or reducing power of the water.



## Chlorine

Chlorine is used to remove germs, such as bacteria and viruses, from drinking water, surfaces, swimming pools and spas, sewage, and industrial waste. Chlorine is used to whiten materials such as clothing and paper.



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## Dissolved Oxygen

Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water, such as that of a swift moving stream, dissolves more oxygen than the still water of a pond or lake.



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## Hardness

Water described as **“hard”** contains high amounts of calcium and magnesium, which are naturally found in the Earth's crust. Total hardness is the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate, in milligrams per liter (mg/L)



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## Biological Oxygen Demand

Biological Oxygen Demand is a measure of the amount of oxygen required to remove waste organic matter from water in the process of decomposition by aerobic bacteria (those bacteria that live only in an environment containing oxygen).



# Biological Parameter

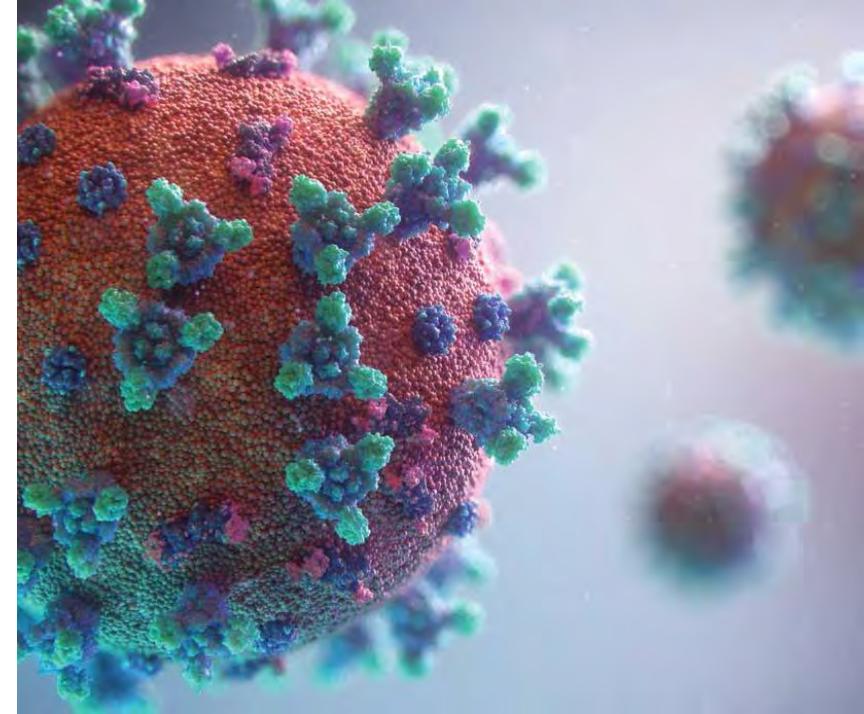
Biological parameters of water include: bacteria, algae, viruses, nutrients like phosphate and nitrogen, turbidity, pH, temperature, dissolved oxygen, biological oxygen demand (BOD), and the presence of various aquatic organisms like zooplankton and macroinvertebrates, which indicate the overall health of the water ecosystem.



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## Algae

Algae are microscopic organisms that live in water and can be found in fresh, salt, and brackish water. While most algae are harmless, some types can produce toxins that can harm people, animals, and the environment.



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## Bacteria

Bacteria in water can include coliform bacteria, E. coli, Legionella, Salmonella, and Cryptosporidium. Some of these bacteria can cause disease.



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## Viruses

Viruses can be found in water, and can cause illnesses in humans. The most common viruses in water include adenoviruses, enteroviruses, noroviruses, and hepatitis A and E viruses.

# Impacts Water Quality

## Key impacts of water quality:

Acidic water: The primary concern is the generation of acidic water due to the exposure of sulfide minerals, leading to low pH levels and the mobilization of heavy metals like lead, copper, and arsenic.

Sedimentation: Mining activities disturb large amounts of soil, causing increased sediment loads in waterways, which can disrupt aquatic ecosystems and impair water clarity.

Chemical contamination: Depending on the minerals being mined, various chemicals used in the extraction process can leach into water sources, including cyanide, mercury, and other toxic substances.

Impacts on aquatic life: Contaminated water from mining can directly harm aquatic organisms by disrupting their physiology and causing reproductive issues.

Drinking water contamination: In areas where mining is prevalent, nearby water sources used for drinking may be contaminated with harmful chemicals, posing a health risk to communities.



# Water Quality Monitoring

Water quality monitoring defined by the International Standardization Organization (ISO) as:

“**The** programmed process of sampling, measurement and subsequent recording or signaling, or both, of various water characteristics, often with the aim of assessing conformity to specified **objectives**”.

Three types of monitoring activities-

- long-term
  - short-term
  - continuous
- The long-term, standardized measurement and observation of the aquatic environment in order to define status and trends.
- The short-term, intensive programmes to measure and observe the quality of the aquatic environment for a specific purpose.
- The continuous, specific measurement and observation for the purpose of water quality management and operational activities.



# Application



Food and Dairy



Aquaculture



Drinking Water



Wineries



Industrial Process



Wastewater



Swimming Pools



Breweries



Environment



Water Treatment



Boilers & Cooling



Catering



Agri/horticulture



Metal



Educational

# Type of Instrument

Chemical Test Kits



Handheld Colorimeters



pH/ISE



Turbidity



Titration



Dissolved Oxygen



Refractometers



Process Instrumentation



Photometers



Mini Controllers



Reagents



Electrodes

# Type of Instrument

Single/Multi Tester



Research Grade  
Benchtop Meter



Handheld Single  
Parameter Meter



Wireless Tester



Handheld  
Multiparameter



Thermometer



Chemical Test Kit



Chemical Oxygen  
Demand (COD) Set



Spectrophotometer



Mini Controllers



Swimming Pool  
pH/ORP Controller



Thermo-Hygrometer

# Type of Instrument



Kemio™ Heavy Metals Kit



Lumiso Pooltest Expert



Turbidity Meter



Electrochemical Meters



Wagtech™ Potalab+ Kit



Pool Contour Comparator



Digital Arsenic Test Kit



# Type of Instrument



Analyzers



OxiTop® -  
Respirometers



Photometers and  
Colorimeters



Process Controllers  
and Sensors



Germany



Turbidimeters



pH/ORP, Cond, DO  
Meters



pH/ORP, Cond, DO  
Meters



# Type of Instrument



USA

Multi-paramter  
Water Quality  
Sonde



Wastewater  
Process  
Monitors and  
Sensors

ProDSS  
Multiparameter  
Digital Water  
Quality Meter



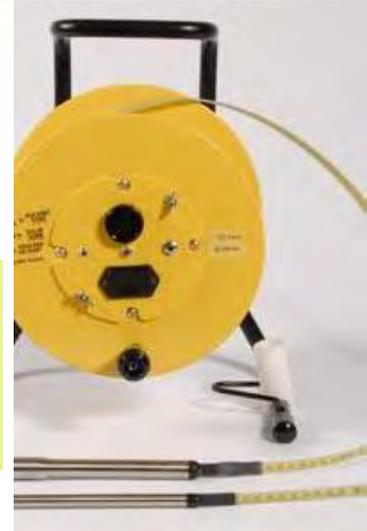
Water Level  
Logger

Flow Probe



Oil Water  
Interface  
Meter

Water Level  
Sounder





## History

The company started in Italy in 1978, and is now located in Woonsocket, RI, USA.

## Location

Hanna manufactures over 3,500 products in production facilities located in USA, Romania, Italy and Mauritius.

## Philosophy

Our philosophy is to supply customers around the world with practical, cost-effective solutions for their testing needs with world-class service and support.

## Development

In 1984 Hanna developed the **world's first micro-** processor based handheld portable pH meter (HI8424) and our innovation continues to this day.

## Quality Control

All Hanna products are in compliance with international standards and our production facilities are ISO 9001 :2000 certified.



18  
75

Wilkinson and Simpson formed

19  
92

Palintest starts operating in Australia

20  
13

Palintest wins **Queen's Award for International Trade**

19  
60

**Dr Palin's method for DPD** become the global standard

19  
93

Palintest starts operating in USA

20  
17

Palintest USA move to new facility

19  
83

Halma plc acquires Wilkinson and Simpson

20  
05

Palintest starts operating in China

20  
18

Palintest opens additional UK site

19  
89

Wilkinson and Simpson renamed to Palintest

20  
11

Palintest acquires Wagtech

20  
19

Palintest releases Kemio

**"Safeguarding water for everyone, every day"**



WTW was founded in 1945 and is specialized in development and manufacturing of high quality measurement technology for water analysis.

Product portfolio includes benchtop meters and sensors, continuously operating, stationary measuring systems and portable meters as well as sensors and probes for mobile use.

WTW products are manufactured exclusively in Germany, directly in our Weilheim in Oberbayern site.

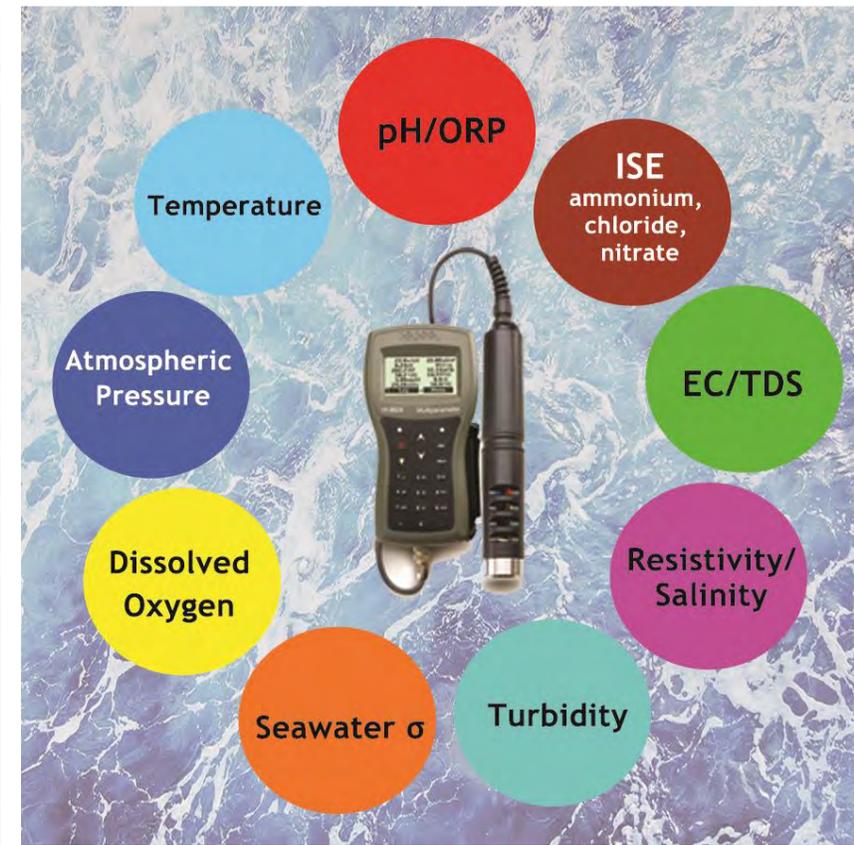


The legacy of our global company reaches back to 1948 and a three-man partnership that was forged at Antioch College in Yellow Springs, Ohio, USA. This village, between Dayton and Columbus, still serves as the headquarters for what started as the "Yellow Springs Instrument Company" — now known as YSI Inc.



USA

# GPS Multiparameter Meters

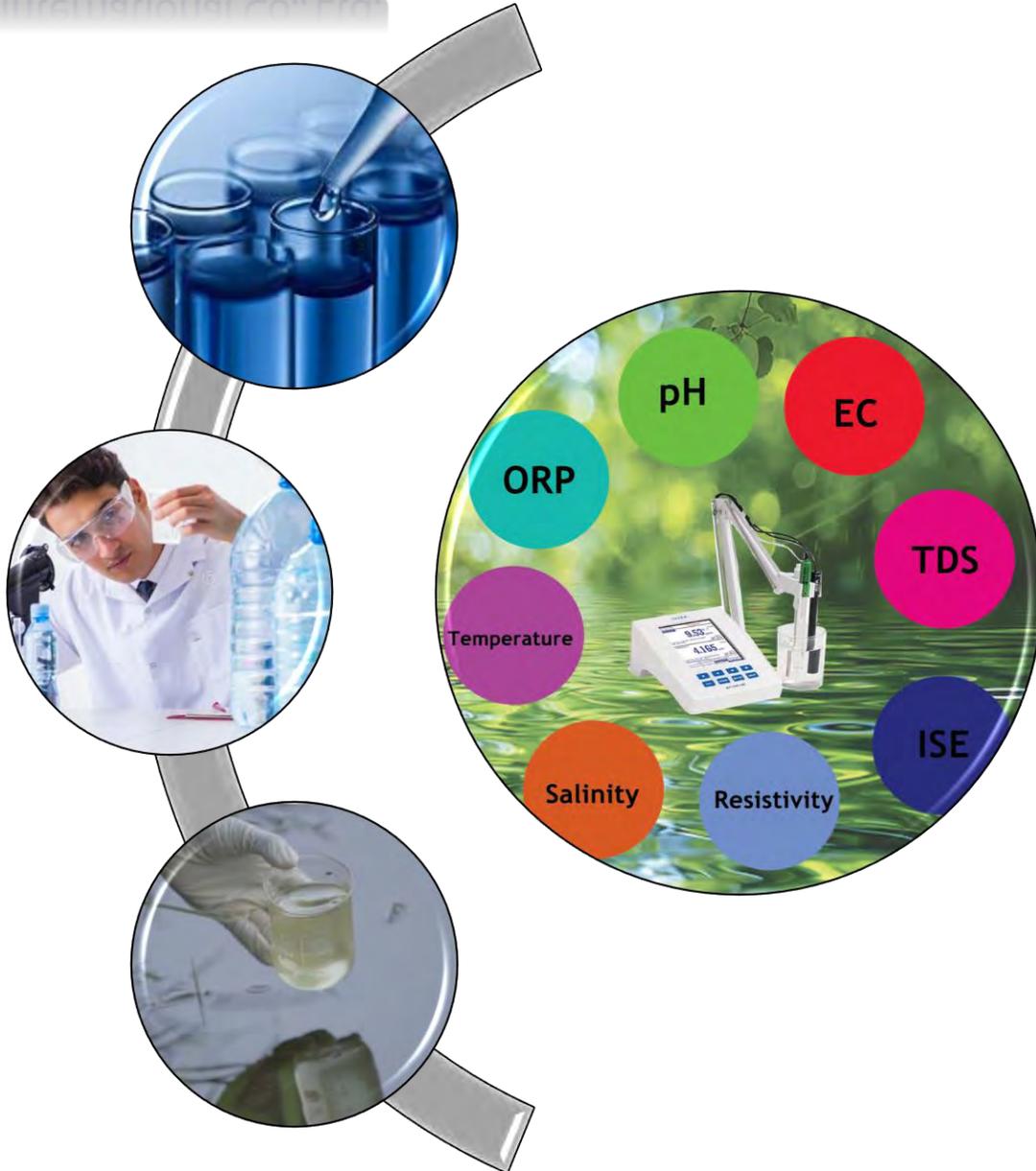


- ✓ The HI9829 is a waterproof portable logging multiparameter meter that monitors up to 14 different water quality parameters.
- ✓ The microprocessor based multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, dissolved oxygen, turbidity, ammonium, chloride, nitrate, and temperature.
- ✓ The probe transmits readings digitally with options to log data while disconnected from the meter.
- ✓ An optional GPS provides location tracking of measurements.
- ✓ The complete system is simple to setup and easy to use.
- ✓ The HI9829 is highly customizable and supplied with all necessary accessories, packaged in a durable carrying case.



# Research Grade Meter

*pH/ORP/ISE and EC/TDS/ Resistivity/Salinity and Temperature*



- ✓ HI-5522 is a high grade benchtop instrument that measures measures seven parameters and incorporates dual channels with a separate temperature probe input and support external reference electrodes required by half-cell pH sens
- ✓ pH - Range: -2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
- ✓ mV - Range:  $\pm 2000$  mV
- ✓ ISE - Range:  $1 \times 10^{-6}$  to  $9.99 \times 10^{10}$  concentration
- ✓ Temperature - Range: -20.0 to 120.0°C
- ✓ EC - Range: 0.000 to 9.999  $\mu\text{S}/\text{cm}$ ; 10.00 to 99.99  $\mu\text{S}/\text{cm}$ ; 100.0 to 999.9  $\mu\text{S}/\text{cm}$ ; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm
- ✓ TDS - Range: 0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt
- ✓ Resistivity - Range: 1.0 to 99.9  $\Omega \cdot \text{cm}$ ; 100 to 999  $\Omega \cdot \text{cm}$ ; 1.00 to 9.99  $\text{K}\Omega \cdot \text{cm}$ ; 10.0 to 99.9  $\text{K}\Omega \cdot \text{cm}$ ; 100 to 999  $\text{K}\Omega \cdot \text{cm}$ ; 1.00 to 9.99  $\text{M}\Omega \cdot \text{cm}$ ; 10.0 to 100.0  $\text{M}\Omega \cdot \text{cm}$
- ✓ Record: 100,000 data point storage
- ✓ Power Supply: 12 VDC adapter

# Multiparameter Photometer with COD for Water and Wastewater

- ✓ HI83399 benchtop photometer measures 40 different key water and wastewater quality parameters using 77 different methods that allow for multiple ranges and variations in chemistry for specific applications.
- ✓ Chemical Oxygen Demand (COD) parameter is included for industrial and municipal wastewater treatment.
- ✓ The Phosphorous and Nitrogen parameters included are beneficial to municipal wastewater treatment customers that need to monitor their biological and chemical nutrient removal process.



Alkalinity  
Aluminium  
Ammonia  
Bromine  
Calcium  
Chloride  
Chlorine Dioxide  
Chlorine  
Chromium (VI)  
COD  
Colour  
Copper  
Cyanuric Acid  
Fluoride  
Hardness, Total

Hydrazine  
Iodine  
Iron  
Langelier Water  
Balance Index  
Magnesium  
Manganese  
Molybdenum  
Nickel  
Nitrate  
Nitrite  
Nitrogen  
Oxygen, Dissolved  
Oxygen Scavengers  
Ozone

pH-Phenol Red  
Phosphate  
Phosphorus, Acid  
Hydrolyzable  
Potassium  
Silica  
Silver  
Sulfate  
Surfactants, Anionic  
Zinc

## 40 Parameters

 **HANNA**  
instruments



# Turbidity Portable Meter



- ✓ The HI98703 is a high accuracy ( $\pm 2\%$  of reading plus 0.02 NTU) Turbidity Portable Meter.
- ✓ The applicable range is 0-40 nephelometric turbidity units (NTU)
- ✓ Detector: Centered at  $90^\circ$  to the incident light path and not to exceed  $\pm 30^\circ$  from  $90^\circ$ . The detector, and filter system if used, shall have a spectral peak response between 400 nm and 600 nm
- ✓ Data Logging - Up to 200 measurements can be stored
- ✓ Calibration - A two, three, or four-point turbidity calibration
- ✓ Power Supply - 4 x 1.5V AA alkaline batteries or AC adapter



**Wagtech™**  
A Palintest Product  
Laboratoires portables pour la qualité de l'eau

# Wagtech™ Potalab+



- ✓ The Potalab+ is the most advanced portable water quality laboratory.
- ✓ With complete digital instrumentation, the Potalab+ delivers laboratory levels of accuracy and is inclusive of digital arsenic testing.
- ✓ The kit is ideally suited to longer-term surveillance and professional monitoring in rural locations.

## Tests

- ⌚ **Chemical tests** for ammonia, arsenic, free chlorine, total chlorine, fluoride, nitrate and nitrite
- ⌚ **Physical tests** for turbidity, pH, conductivity, TDS and temperature
- ⌚ **Microbiological tests** for thermotolerant or faecal coliforms and total coliforms

**Produits  
Humanitaires et  
Wagtech**

Améliorer l'eau potable  
et les standards WASH  
pour tous

[www.palintest.com](http://www.palintest.com)

# Lumiso Expert Robust Multi-parameter Photometer

## Features

- ✓ Robust construction - Impact tested to IK08 as part of EN61010. Scratch and chemical resistant coating.
- ✓ IP67 waterproof design - Designed for use in wet and humid environments.
- ✓ Large touchscreen interface - Intuitive and accessible with easy navigation, also works with wet and gloved hands.
- ✓ Multilingual onscreen instructions - Step-by-step instructions on performing tests with little to no prior training required.
- ✓ Data logging - Results are saved automatically, including test data, user, labels, and notes for audit and compliance.
- ✓ Data retrieval - Easy access to data via Palintest Connect.
- ✓ Recycled Materials - Case is made with recycled plastic.
- ✓ Easy results retrieval with Palintest Connect.



LUMISO PHOTOMETER



**Lumiso**  
A Palintest Product



**Palintest**  
Water Analysis Technologies

## 37 Parameters

Alkalinity  
Aluminium  
Ammonia  
Bromine  
Calcium Hardness  
Chloride  
Chlorine Dioxide  
Chlorine  
Chromium (VI)  
COD  
Colour  
Copper  
Cyanuric Acid  
Fluoride  
Hardness, Total

Hydrogen Peroxide  
HR  
Iron  
Langelier Water  
Balance Index  
Magnesium  
Manganese  
Molybdate  
Nickel  
Nitrate  
Nitrite  
Ozone  
Phosphate  
pH-Phenol Red

Potassium  
Salt  
Silica  
Sulfate  
Sulfide  
Sulfite  
Total Nitrogen  
Transmittance  
Turbidity  
Zinc

**Palintest**  
Water Analysis Technologies



# Arsenic Test Kit

The Palintest Arsenator kit solves the complex problem of how to measure Arsenic in the field accurately and safely.

Built around an unique tri-filter assembly, the Palintest Arsenator simplifies and improves field arsenic testing to exceed the **WHO guideline value of 10 ppb in drinking water**.

- Sensitivity down to 2 parts per billion - unique in a field analysis system
- 3-stage filter system increases sensitivity, removes interference from Sulfide and protects the operator.
- Comprehensive field kit containing all required accessories and consumable.

## Measuring System Colorimeter

Range 2 – 100 ppb ( $\mu\text{g/L As}$ )

Display LCD

Reaction time 20 minutes

Size (W x L x H) & 390 x 330 x 95 mm,

Weight 1.75g



# Kemio™ Multi

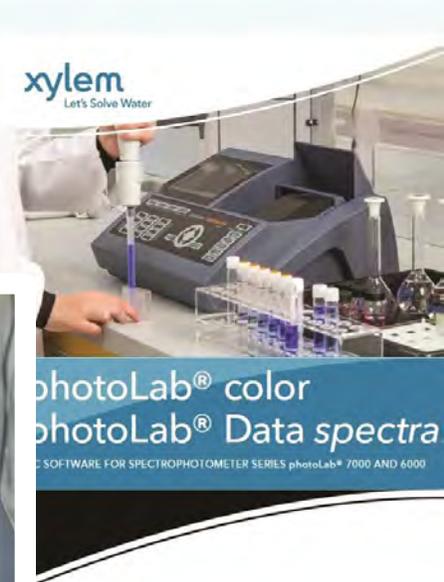


- ✓ Kemio™ uses a sophisticated electrochemical technique, powered by **Palintest's** patented single-use sensor technology, to test for chemicals and heavy metals in water.
- ✓ It is widely used by public authorities, water utilities and water management organisations, and the food and beverage industry to protect the public and the environment and ensure compliance with regulations.
- ✓ **Kemio's** single-use sensors generate an electrical current by reacting with the chemical or metal in the water sample. Kemio™ measures this electrical signal to determine the concentration of contaminants within the sample.

# Spectrophotometer photoLab® 7600 UV-VIS

photoLab® 7600 UV-VIS covering the range from 190 to 1100 nm. Ideal for additional self-control with optical reagent-free methods (OptRF) and UV-VIS procedures for many applications.

- Barcode support for test kits in round and rectangular cuvettes
- Automatic cuvette recognition with 10, 20 and 50 mm cuvettes
- Automatic measurement range adjustment
- Automatically stored data and comfortable data management
- More than **200 methods** including special procedures such as free Ammonia, CO<sub>2</sub>, SAC and color
- Programming of user-defined methods
- Eco-friendly minimization of reagents and tests
- Linking IQ Sensor Net to photometric methods



photoLab® color  
photoLab® Data spectra  
SOFTWARE FOR SPECTROPHOTOMETER SERIES photoLab® 7000 AND 6000



# BOD Self Check System



- ✓ BOD Standard Measurement for Self-checking according to DIN EN 1899-2 and ASTM 5210 D
- ✓ Up to 12 parallel samples in a sample set
- ✓ Statistic averaging
- ✓ Measurement duration between 0.5 h and 180 days
- ✓ For special applications: Freely selectable vessel, sample volume and incubation temperature
- ✓ BOD measuring range up to 400000 mg/l - Automatic calculation of dilution as a function of total volume and vessel.

# Digital Handheld Water Flow Probe



Records 30 data sets, and readings are in feet or meters per second.



Telescoping handles ranging from 3 feet to 14 feet



Rain-proof digital computer and display with 5 year shelf life



Lightweight, rugged and reliable

## EXO MULTIPARAMETER SONDES

1. Conductivity/Temperature,
2. Depth,
3. Dissolved Oxygen,
4. fDOM,
5. ISE
6. Ammonium,
7. ISE Chloride,
8. ISE Nitrate,
9. pH,
10. pH/ORP,
11. Rhodamine,
12. Total Algae (PC or PE),
13. Turbidity,
14. UV Nitrate



# PRODSS MULTIPARAMETER DIGITAL WATER QUALITY METER



## Parameters



Dissolved Oxygen (optical)

Turbidity

Total Algae-Phycocyanin

Total Algae-Phycoerythrin

pH

ORP/Redox

Conductivity

Specific Conductance

Salinity

Total Dissolved Solids (TDS)

Resistivity

Seawater Density

Total Suspended Solids (TSS)

Depth

GPS Coordinates

Ammonium

Ammonia

Chloride

Nitrate

Temperature

Barometric Pressure



# WHAT IS THE BASIC OF AIR POLLUTION?

📌 Chemical

📌 Physical

📌 Biological

Indoor

Out  
door

## Chemical Parameter

- Air Quality Index (AQI),
- Carbon Monoxide (CO),
- Nitrogen Monoxide (NO),
- Nitrogen Dioxide (NO<sub>2</sub>),
- Ozone (O<sub>3</sub>), Sulphur
- Dioxide (SO<sub>2</sub>),
- Ammonia (NH<sub>3</sub>),
- Particulate matter (PM<sub>10</sub> & PM<sub>2.5</sub>)
- Etc.

## Physical Parameter

- Air temperature
- Relative humidity
- Air movement
- Wind Speed & Direction
- Ultraviolet (UV)
- Etc.

## Biological Parameter

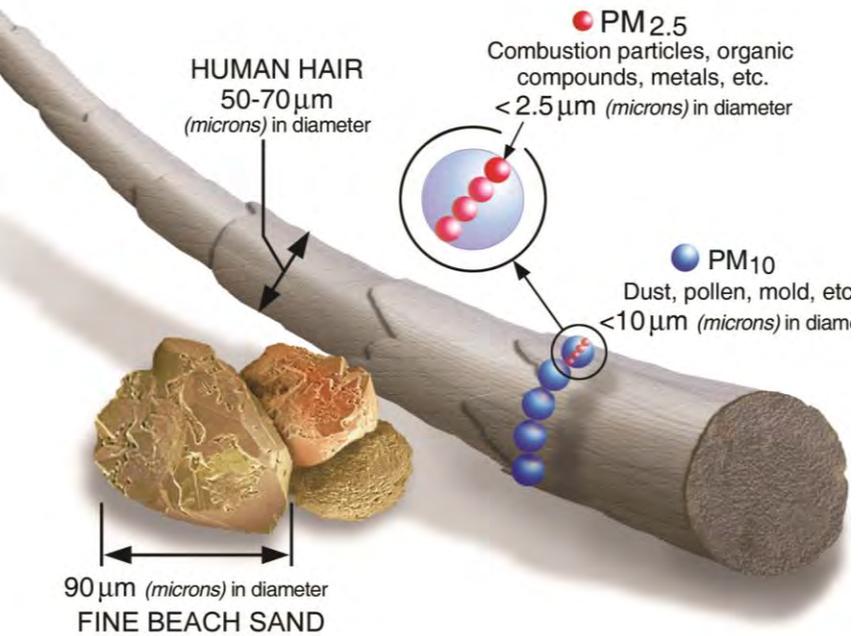
- Bacteria,
- Molds,
- Mildew,
- Viruses,
- Animal Dander and
- Cat saliva,
- House dust,
- Mites,
- Cockroaches, and
- Pollen
- Etc.



# Chemical Parameter

The primary chemical parameters used to measure air quality and assess its impact on health are particulate matter (PM), specifically PM<sub>2.5</sub>, and various gases like ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide.

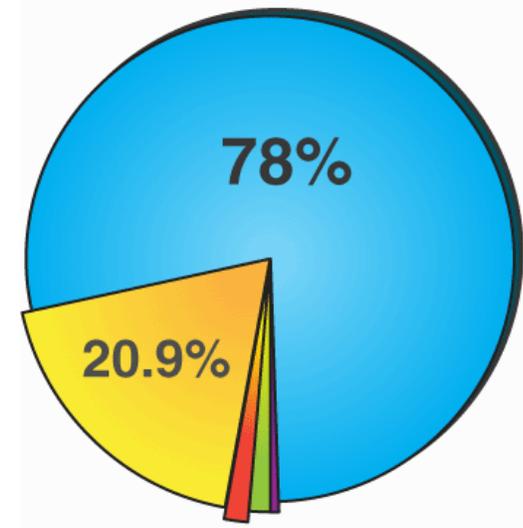




## Air Quality Index (AQI),

The Air Quality Index (AQI) is used for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air.

## COMPOSITION OF AIR



- Nitrogen - 78%
- Oxygen - 20.9%
- Other Gases - >0.1%
- Argon - >0.90%
- Carbon Dioxide - >0.04%

## Particulate Matter (PM)

PM stands for particulate matter (also called particle pollution): the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye



## Gases

More than 99% of air is made of three gases: nitrogen, oxygen, and argon. Air contains other gases in very small quantities, including gaseous water, which is called water vapor. Air also contains solids and liquids.



# Physical Parameter

Physical parameters in air refer to measurable characteristics that describe the state and behavior of air, including temperature, pressure, density, humidity, and the presence of various gases and particles. These parameters are crucial for understanding atmospheric conditions, air quality, and weather patterns.





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## Relative Humidity

Air relative humidity is a measure of the amount of moisture in the air compared to the maximum amount of moisture the air can hold at that specific temperature.



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## Temperature

Air temperature refers to the degree of hotness or coldness of the surrounding air, essentially measuring how warm or cool the air is at a given location, typically measured in degrees Celsius (°C) or Fahrenheit (°F).



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## Winds

Wind is the movement of air, and it can be gentle or strong. It's caused by differences in air pressure, which are created by temperature differences.



# Biological Parameter

Biological parameters in air are biological contaminants, such as bacteria, viruses, and pollen, that can be found in both indoor and outdoor air.



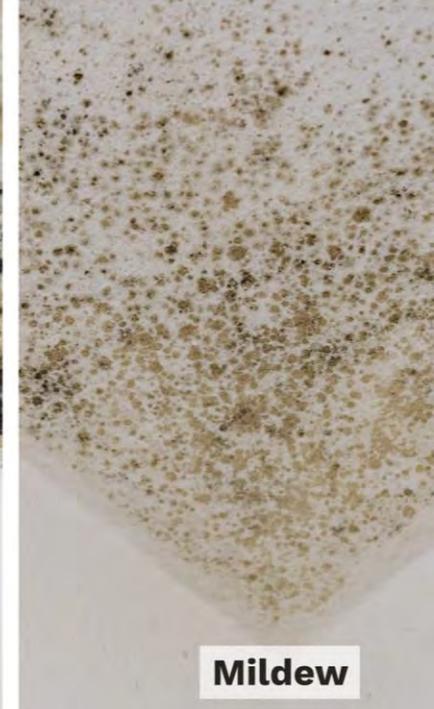
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## Viruses

A virus is a submicroscopic infectious agent that replicates only inside the living cells of an organism. Viruses infect all life forms, from animals and plants to microorganisms, including bacteria and archaea. Viruses are found in almost every ecosystem on Earth and are the most numerous type of biological entity.



**Mold**

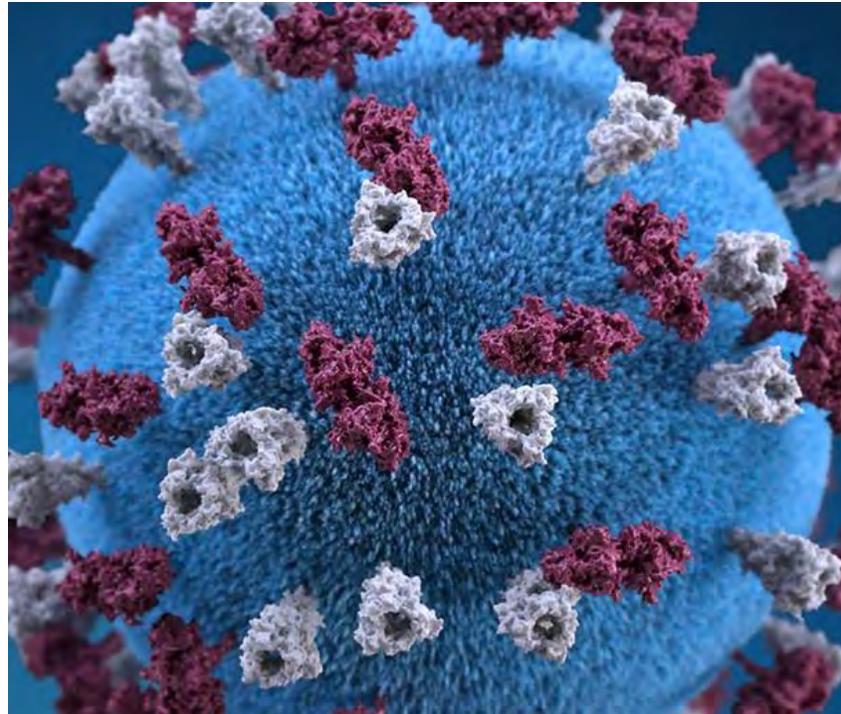


**Mildew**

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## Bacteria

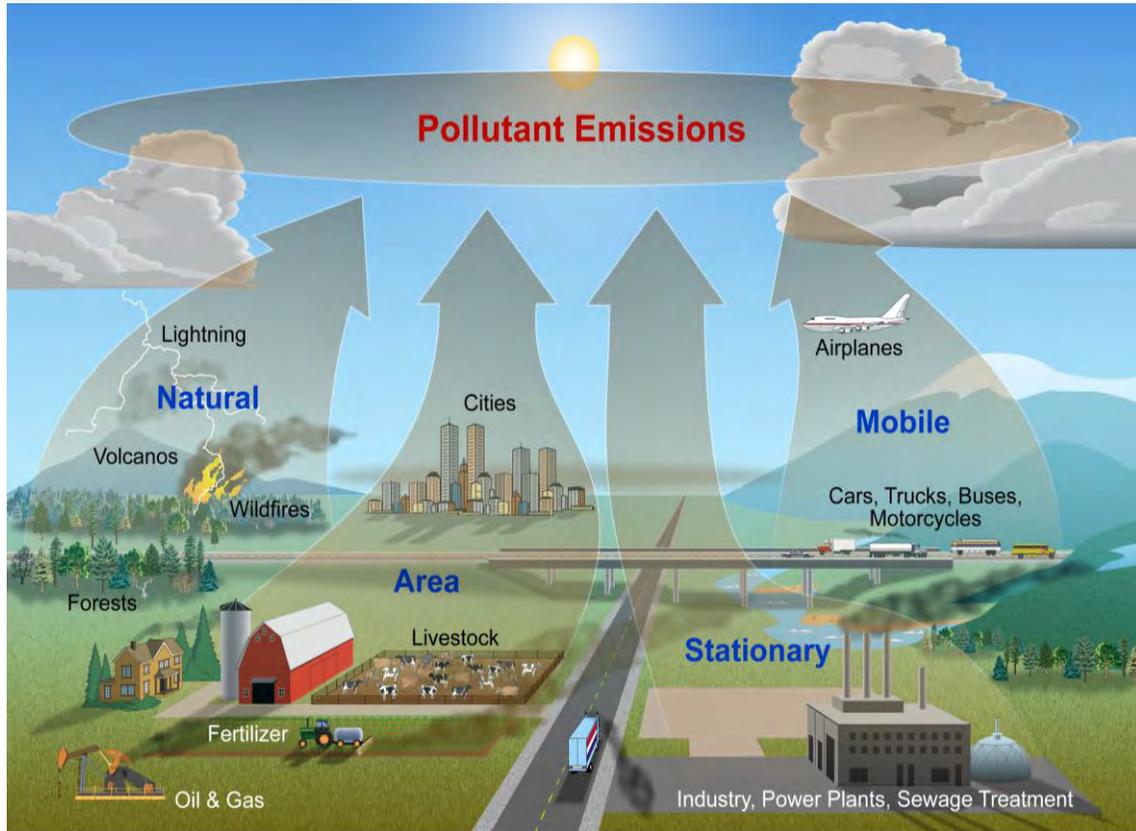
Bacteria are tiny, single-celled living organisms. There are millions of different types of bacteria. Many can be found in and on your body and are beneficial to you.



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## Mold and Mildew

Mold and mildew are both types of fungi that grow in damp environments. Mold can be fuzzy and come in many colors, while mildew can be powdery and appear flat.



# Air Pollution



Pollutants can be either:

- Primary Pollutants: emitted directly to atmosphere
- Secondary Pollutants: formed by reactions involving primary pollutants and other constituents within the atmosphere

Sources can be either:

- Stationary: Chimneys, lagoons, refineries, etc
- Mobile: Automobile, ships, planes, etc

Cause of source can be:

Natural - **decomposing organics, wildfire, volcano, dust storm,...**

**Anthropogenic - burning of fossil fuels for electrical energy generation, automobile transportation, industry, ...**

Urban - motor vehicle

# Pollutants of Interest



## USEPA Reference Pollutants

Air Pollutant of interest	Type	Source Example	Useful Detection Limits	Range to Expect	Level
Ozone (O3)	Secondary	Formed via UV (sunlight) and pressure of other key pollutants	10 ppb	0-150 ppb	75 ppb (8 hr)
Carbon monoxide (CO)	Primary	Fuel combustion- mobile sources, industrial processes	0.1 ppm	0-0.3 ppm	9 ppm (8 hr) 35 ppm (1 hr)
Sulfur Dioxide (SO2)	Primary	Fuel combustion- mobile sources, industrial processes	10 ppb	0-100 ppb	75 ppb (1 hr) 0.5 ppm (3 hr)
Nitrogen Dioxide (NO2)	Primary and Secondary	Fuel combustion-mobile sources, electric utilities, off-road equipment	10 ppb	0-50 ppb	100 ppb (1 hr) 53 ppb (1 yr)
Carbon Dioxide (CO2)	Primary	Fuel combustion-electric utilities, mobile sources	100 ppm	35-600 ppm	None
Fine particulate matter (PM2.5)	Primary and Secondary	Fuel combustion (mobile sources, electric utilities, industrial processes), dust, agriculture, fires	5 µg/m <sup>3</sup> (24-hr)	0-40 µg/m <sup>3</sup> (24-hr)	35 µg/m <sup>3</sup> (24-hr) 12 µg/m <sup>3</sup> (1 yr)
Particulate matter (PM10)	Primary and Secondary	Dust, fuel combustion (mobile sources, industrial processes), agriculture, fires	10 µg/m <sup>3</sup> (24-hr)	0-100 µg/m <sup>3</sup> (24-hr)	150 µg/m <sup>3</sup> (24 hr)

# Hazardous and Odorous Pollutants



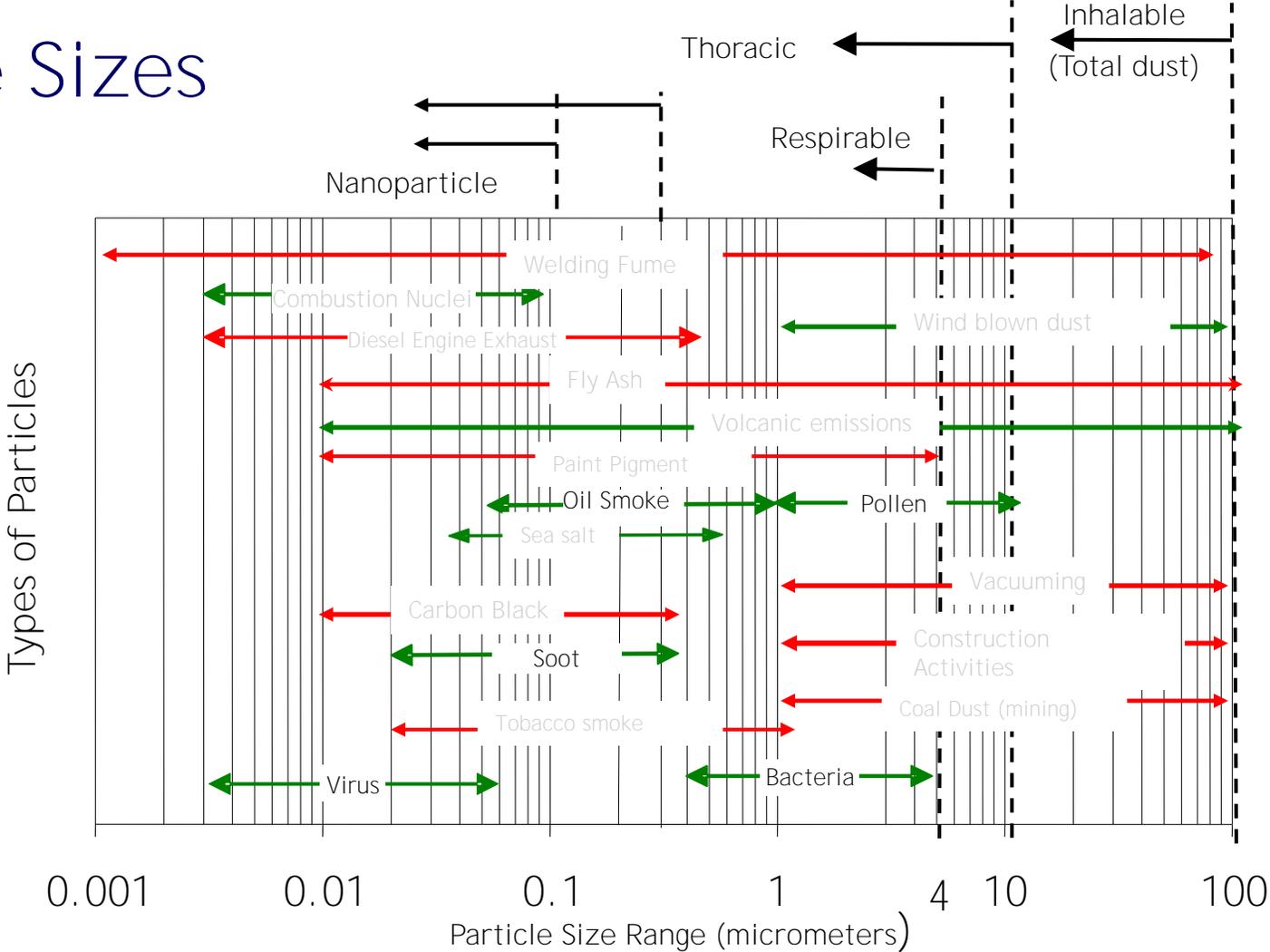
Compound	Type	Issue	Sources	Detection required
VOC	Primary	Health Odour	Industries, urban	<1 ppb
H2S	Primary	Odour Health at high levels	Industries, WWTP	1 ppb Odour 1 ppm Health
N2O	Primary	GHG	Natural Anthropogenic Urban WWTP	1 ppm
Methane	Primary	GHG Health (LEL)	Natural Agriculture Landfill	10 ppm 1% LEL

# What is Aerosol

Aerosol :  
Fume, Mist, Smoke, Dust



# Particle Sizes



← Environmental / Naturally Occurring Particles →

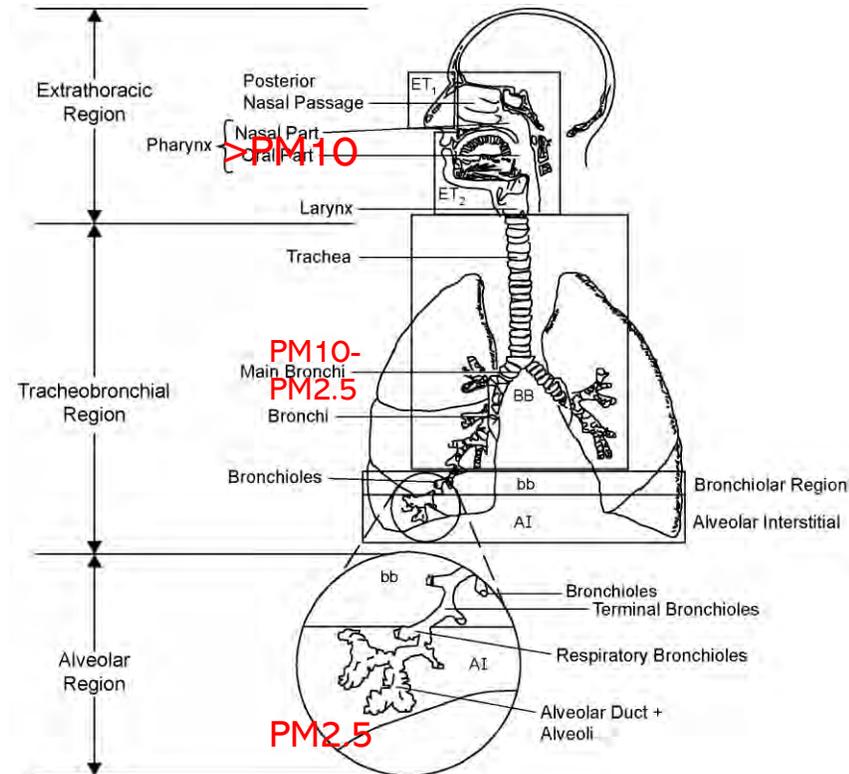
← Workplace / man-made Particles →



# Size Matters!

# Respiratory Tract

- Extrathoracic region: uppermost region
- Tracheobronchial (TB) region: middle region
- Alveolar (A) region: innermost region



Based on International Commission of Radiological Protection (1994) and U.S. Environmental Protection Agency (1996a).

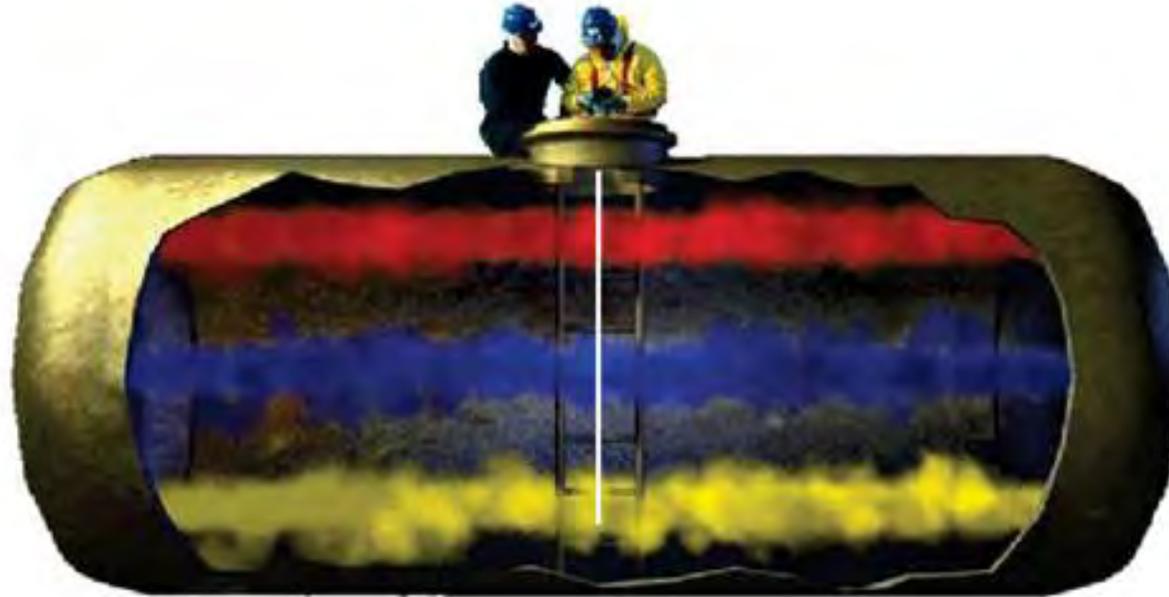
Air Quality Criteria for Particulate matter, 2004, p 6-5.

# Sources of Gas



# Atmospheric Testing

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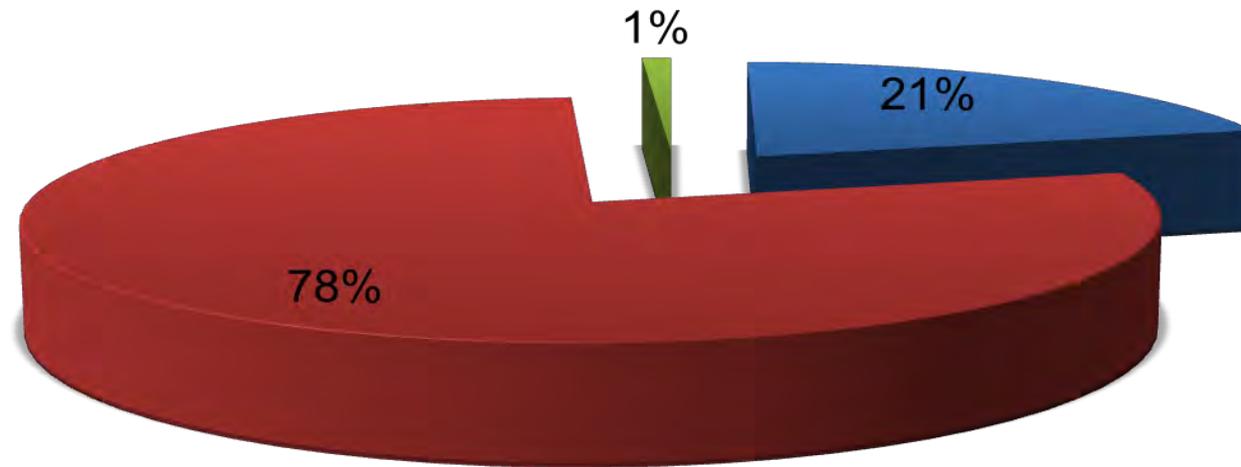
*METHANE (lighter than air)*

*CARBON MONOXIDE (slightly lighter than air)*

*HYDROGEN SULFIDE (heavier than air)*

# *Normal Atmosphere*

■ Oxygen ■ Nitrogen ■ Other





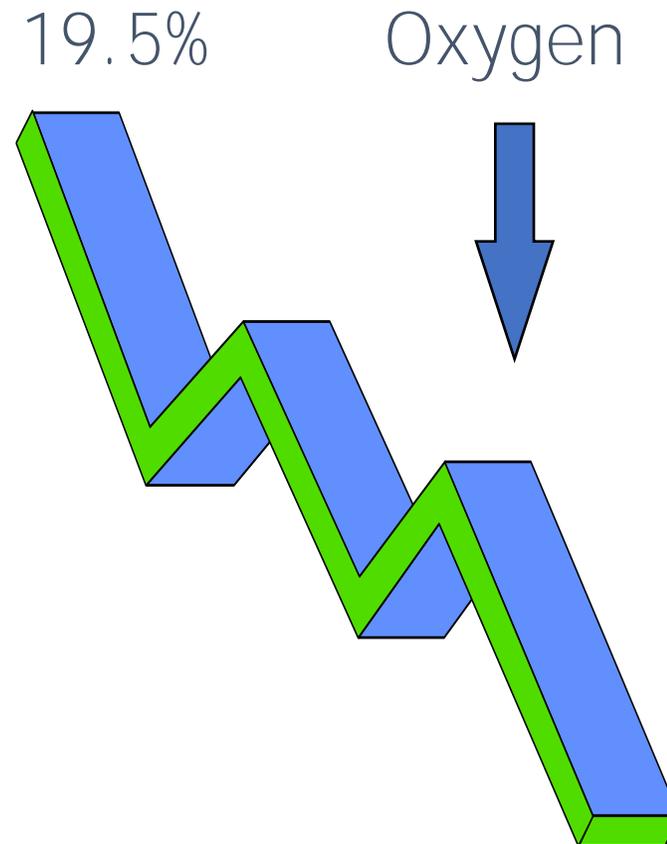
Oxygen  
Deficiency



# Oxygen Deficiency

Risk of asphyxiation Caused by

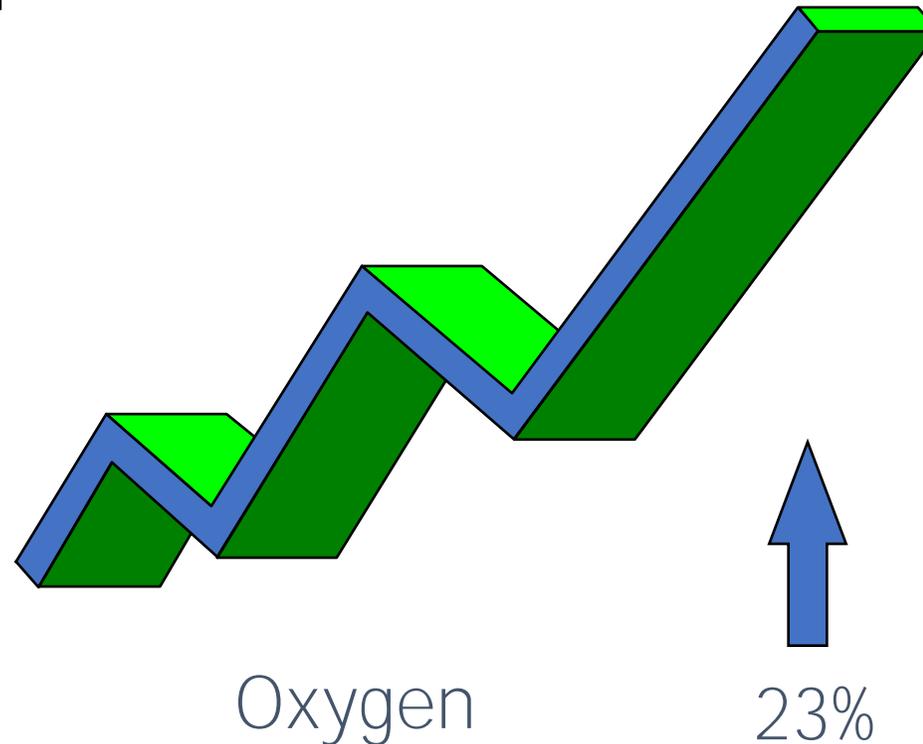
- ◆ Consumption
- ◆ People
- ◆ Oxidation
- ◆ Bacterial action
- ◆ Displacement
  - ◆ Humidity
  - ◆ Inert gases



Accident VDO

# Oxygen Enrichment

- Serious fire hazard  
Materials burn much more rapidly
- Caused by
  - leaking valves
  - leaking cylinders



Accident VDO

# Effects of Oxygen

23.5% vol.

- Maximum safe level (OSHA)

21.0% vol.

- Oxygen content in Air (20.954%)

19.5% vol.

- Minimum safe level (OSHA, NIOSH)

17.0% vol.

- Impairment of judgment begins

16.0-12.0% vol.

- Breathing and pulse rate increase, coordination is impaired

# Effects of Oxygen

14.0-10.0% vol.

- Fatigue, disturbed respiration

10.0-6.0% vol.

- Nausea and vomiting, inability to move freely and loss of consciousness

<6.0 % vol.

- Convulsive movements and gasping respiration occurs; later heart rate ceases

3.0-5.0% vol.

- Life expectancy three to five minutes

# Carbon Monoxide Data

- CO: Colorless, odorless, byproduct of incomplete combustion
- Hazard: Flammable, LEL 12.5%
- Health: Very Toxic (can be absorbed 200-300 time faster than oxygen by the hemoglobin)
- Industries : Steel mills, garages, general industries



# Effects of CO

50 ppm

- Permissible exposure limit, 8 hour OSHA

400 ppm

- Frontal Headache in 2-3 hours

1600 ppm

- Headache and nausea 20 minutes
- Collapse and death in 1-2 hours

6400 ppm

- Headache, dizziness in 1-2 minutes, unconsciousness and death in 10-15 minutes

# Effects of CO

- Will remain in the body for up to 36 hours.
- The average person exposed to 400 ppm, after 15 minutes, will experience the symptoms of Carbon Monoxide poisoning.

# Hydrogen Sulfide Data

- $H_2S$ : Colorless, Rotten egg smell
- Hazard: Flammable, LEL 4.0%
- Health: Extremely Toxic, appears naturally from decomposition, has a paralyzing effect on the nervous system that controls breathing
- Industries : Oil and Gas, pulp and paper, waste water treatment



# Effects of H<sub>2</sub>S

0.13 ppm

- Minimal perceptible odor

10.0 ppm

- Beginning of eye irritation, permissible exposure limit OSHA

100.0 ppm

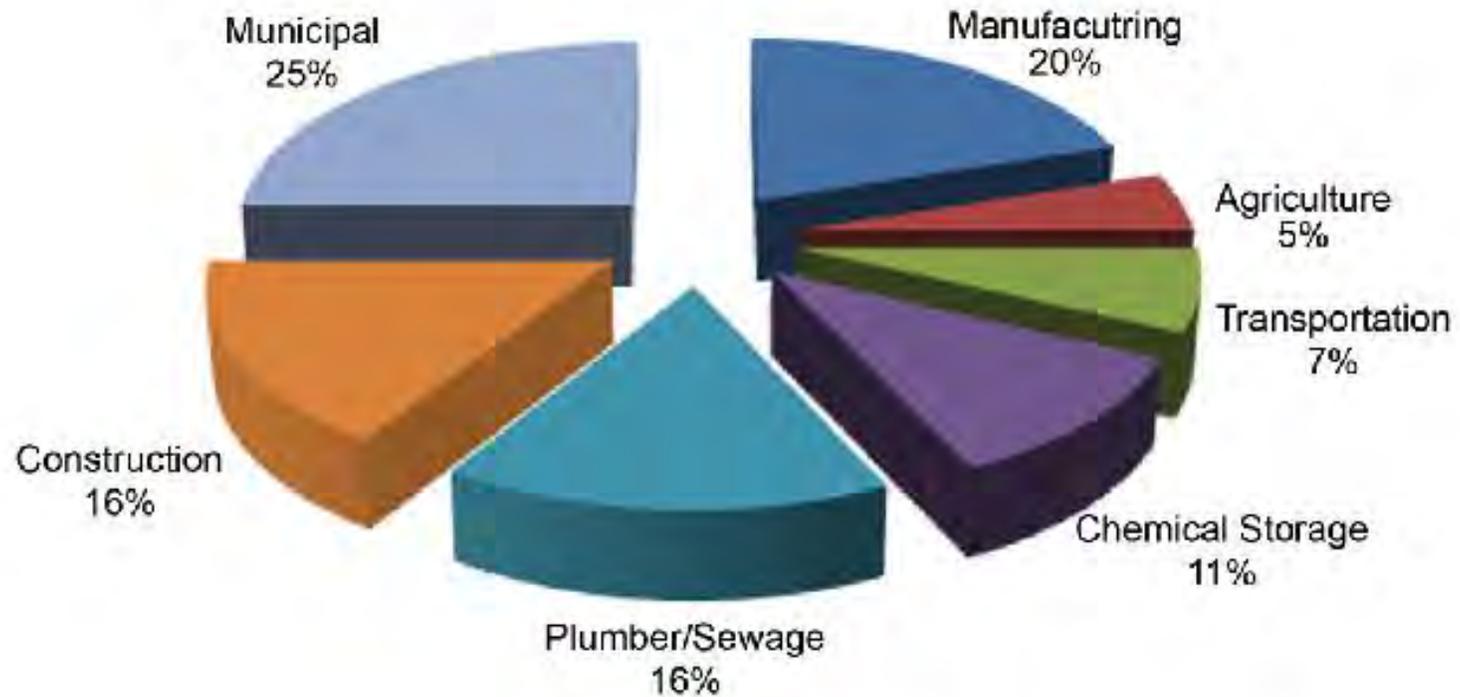
- Coughing, eye irritation, loss of sense of smell after two to five minutes

500.0 ppm

- Loss of consciousness and possible death 30 minutes to one hour

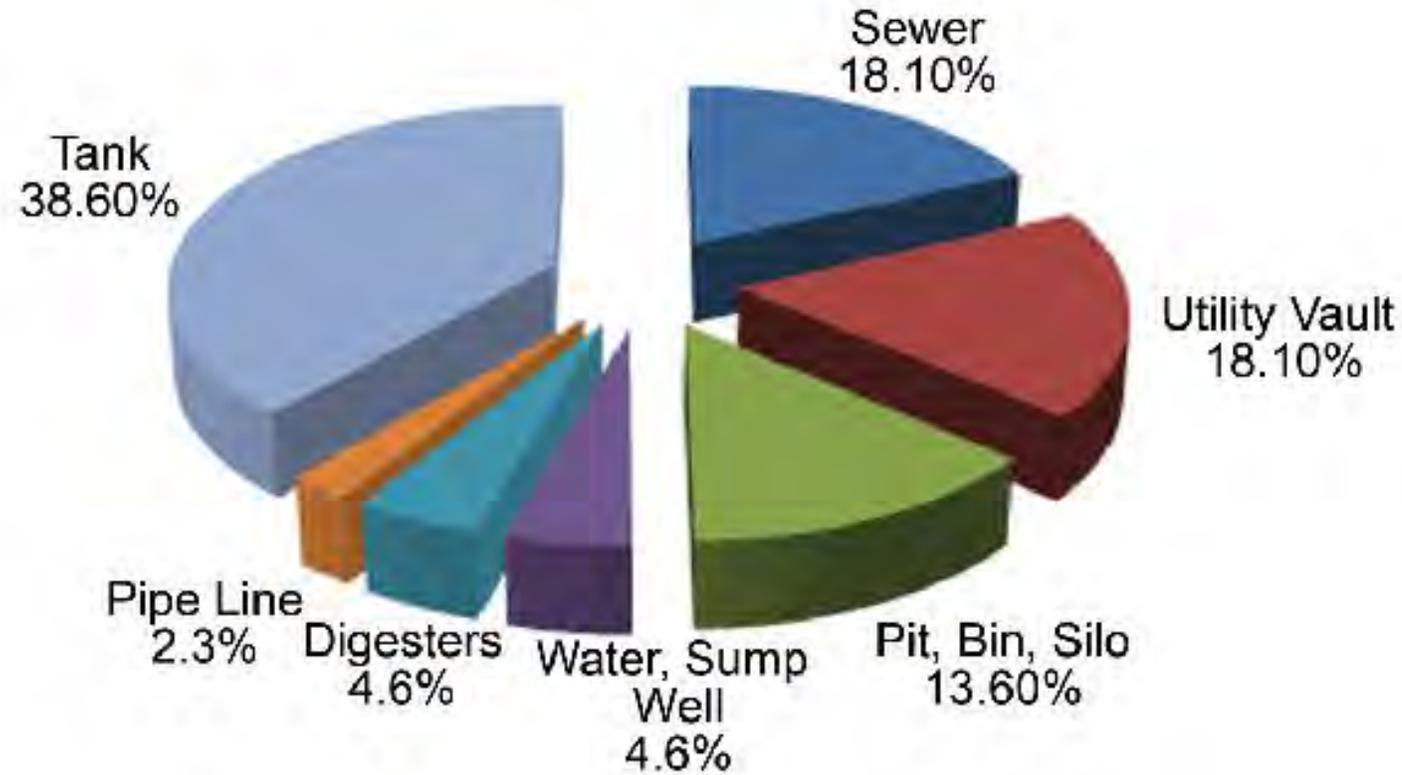
# Death By Industry

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## Death By Type of Confined Spaces

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# Why do we Need to Conduct Air Quality Monitoring?



- **Nuisance:** dust, odour, visible smog
- Protect against hazardous substances
- Understand time and location changes to pollutants in the air
- Discover critical episodes in an industrial plant
- Determine efficiency of pollution control strategies
- Enforce air Quality Regulation

# Application



Landfill & Compost



Pulp & Paper



Wastewater



Food & Beverage



Lab. & Research



General Manufacturing



Livestock & Agriculture



Cannabis



Oil & Gas



Mining

# APPLICATION

Hot Work



Turnarounds  
and Shutdowns



Lone Workers



In-Plant Monitoring



Fence-Line and  
Perimeter  
Monitoring



Confined Spaces



Emergency  
Response



Fleet  
Management



Personal  
Monitoring



# Type of Gas



Ammonia (NH<sub>3</sub>) Gas Detectors



Chlorine Dioxide (ClO<sub>2</sub>) Gas Detectors



Hydrogen Chloride (HCl) Gas Detectors



Carbon Dioxide (CO<sub>2</sub>) Gas Detectors



Hydrogen (H<sub>2</sub>) Gas Detectors



Hydrogen Cyanide (HCN) Gas Detectors



Carbon Monoxide (CO) Gas Detectors



Chlorine (Cl<sub>2</sub>) Gas Detectors



Methane (CH<sub>4</sub>) Gas Detectors

# Type of Gas



Hydrogen Sulfide  
(H<sub>2</sub>S) Gas Detectors



Sulfur Dioxide  
(SO<sub>2</sub>) Gas Detectors



Nitric Oxide (NO)  
Gas Detectors



Nitrogen Dioxide  
(NO<sub>2</sub>) Gas  
Detectors



Oxygen (O<sub>2</sub>) Gas  
Detectors



Phosphine Gas  
Detectors (PH<sub>3</sub>)

# Type of Instruments

SCENTINAL



This continuous monitoring station collects data from a variety of sensors and presents it in an easy to understand graphical interface.

FLYING LAB



Can be used to sample and analyze ambient air at heights of up to 125 meters above ground level.

DR2000



We've improved upon the DR1000 in several ways. [Click here](#) to find out all of the amazing features it now offers.

POLLUTRACKER



Multi-sensor device that measures the concentrations of chemicals using up to 10 sensors and analyzers.

# Type of Instruments

HVAC WARDEN



Keeps facility occupants safe by providing real-time air monitoring based on high accuracy detection of dangerous gases.

CTAIR PLUS



This station collects information from a variety of sensors within an urban area and presents it in an easy to understand graphical interface.

AQSAFE



Observes your indoor air quality with up to 12 sensor varieties including temperature and humidity. Sensors can track dust, VOC's, and more.

URBAN SCANNER



A complete scanner solution that provides detailed air quality information within urban landscapes.

# Type of Instruments

## VENTIS® PRO5

The Ventis Pro5 5-gas monitor gives you the power to monitor up to five gases simultaneously.



## VENTIS® MX4

4-Gas Monitor



## RADIUS® BZ1

Area Monitor



## MX6 IBRID®

Six-Gas Monitor



## TANGO® TX2

Two-Gas Monitor



## TANGO® TX1

Single-Gas Detector



## T40 II RATTLER™

Portable Single Gas Monitor and T-Dock™



## GASBADGE® PRO

Single-Gas Monitor



# Type of Instruments



Wireless Weather Station



Wireless Rain Station



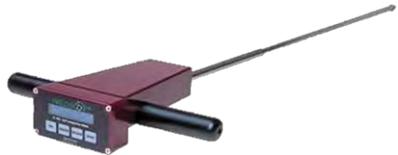
Wireless Plant Growth Station



Soil Moisture Meter



Soil Moisture Meter



Soil Compaction Tester



Soil Compaction Tester



Quantum (PAR) Meter

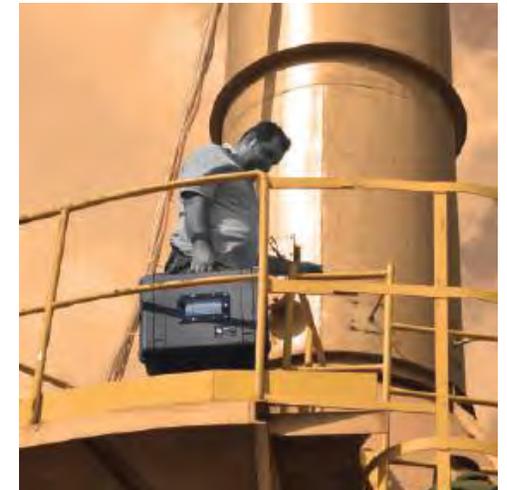


Light Meter



Soil Moisture Sensor

- Scentroid is the world leader in air pollution and odour measurement equipment and services.
- Based in Toronto, Canada, we export to over 45 countries around the world.
- We are the **world's** premier manufacturer of odour sampling and analysis equipment.
- With decades of experience developing state-of-the-art instrumentation for environment, nuclear, and medical industries, we bring new and innovative technologies to the field of odour measurement.
- Our clients include government agencies, environmental laboratories, research institutions, and industries dealing with odour nuisances.



1876

Industrial Scientific was born as the research division of the National Mine Service Company (NMS), focused on developing instrumentation to detect methane gas.

**INDUSTRIAL  
SCIENTIFIC**



1985

NMS sold the division, and Industrial Scientific Corporation began operating as a private company. With ongoing investments in research and engineering, the gas detector family grew to include patented technologies and state-of-the-art designs.

2017

Industrial Scientific was acquired by Fortive Corporation, a diverse global science and technology company dedicated to accelerating progress around the world. Fortive has and will continue to provide the tools and resources to achieve Our Vision.

2019

Fortive Corporation acquired Intelx Technologies, which develops web-based management systems that optimize business performance, enable regulatory compliance, and streamline ISO initiatives. Paired together, Industrial Scientific and Intelx are a market leader in hardware-enabled software workflows.

Today

We are a leader in lifesaving products and technologies that improve in-the-moment safety outcomes for workers worldwide. Our wearable, area monitoring, and software solutions detect gases, offer remote real-time monitoring, guide emergency response teams, and so much more. Our company has over 1,300 employees across the globe committed to preserving human life and ending death on the job by 2050.



*Helping our valued partners transform plant measurements into more profitable growing decisions*

**37 YEARS  
IN BUSINESS!**

**Spectrum<sup>®</sup>**  
Technologies, Inc.



At Spectrum Technologies, we pride ourselves on helping our valued partners transform plant measurements into more profitable growing decisions. Since 1987, we have manufactured and distributed affordable, leading-edge plant measurement technology to agricultural, horticultural, greenhouse and turf markets globally, serving more than 14,000 customers in 80+ countries.

# Air Quality & Odour Monitoring Station

**SL50**  
**Scential**

Maximum # of Sensors	: 20
Type of Sensors	: PID, NDIR, EC, Laser Particulate counter, and MOS
Sampling rate	: 1 per minute
# Of Sampling Ports	: 1 to 2
Weight	: 81 lbs
Size	: <b>24'' x 20'' x 8''</b>
Power Requirements	: 100-240V 50/60Hz 2A
Power Consumption	: 30W without AC - 150W with AC
Communication	: 3G/4G (default), LAN (default), WIFI (optional), MODBUS
On-board data Storage	: <b>64GB - SD Card</b>
Cloud Server	: Included by Default
On-Board Server	: Included by Default
User Interface	: <b>7'' touch screen on Panel door</b> and Remote access Sensor Information Management System
Ambient Temperature Range	: 0 to 35 °C without AC system -50 to +50 °C with Heating and AC system
Sample Conditions	: -50 to +50°C and 10 - 90% RH without predilution system -50 to 120°C and 0 - 100% RH with pre-dilution system
Calibration	: <b>Manual, using calibration gas and on-board screen,</b> Optional, automatic calibration using built-in calibration gas
Warranty	: <b>24 months full warranty on all parts including sensors</b>
Sensor Replacement	: dependent - first 2 years covered by warranty
Sensor Frequency	
Software	: SIMS3 - Sensor Information management System - free access for life of product
Cabinet	: NEMA 4X
Mounting Hardware	: Wall mounting hardware included



**SCENTROID**  
Future of Sensory Technology



# CTair Air Quality Monitor

Maximum # of sensors	: 11 (4xEC, 1xCO2, 1xPID, 1xCH4, 1xPM, T, RH, Barometer)
Type of sensors	: PID, NDIR, EC, Laser Particulate Counter, Temperature and
Relative	Humidity, and Barometric Pressure
Sampling rate	: Approximately 1/m
Weight	: 4.5kg with solar panel
Size	: 19 x 29 x 14cm CTair unit, 37 x 34cm for solar panel mounted on top
LED Indicator	: Color-changing LED Light displaying unit status
Communication	: WiFi, 3G, 4G, LoRa
Power Requirement	: Solar power and AC power, 110 - 240 VAC
Cloud server	: Data logging, analysis, alarms, remote management
Alarm Equipped	: On cloud, not on the unit itself
Temperature range	: -40 to 40 °C
Operating R. Humidity	: 10 - 90%
Device Health	: Daily sensor health checks and provides sensor replacement reminders
Warranty	: 24 months full warranty to all parts including sensors
Sensor replacement	: Sensor dependent - first 2 years covered by warranty
Mounting	: Configurable for wall or pole mount
Battery Only Runtime	: 36 hours (base model)
Traffic Information	: Vision-based traffic classification and count
Design Rating	: IP53
Local Storage	: SD card - long term continuous logging
Internal Access	: Securable by cable/pad lock
Calibration	: Factory calibration to fully documented procedures in accordance with our ISO 9001 quality management system



## Sensors

- Carbon Monoxide
- Chlorine
- Hydrogen
- Hydrogen Chloride
- Hydrogen Cyanide
- Phosphine
- Hydrogen Sulfide
- Nitric Oxide
- Nitrogen Dioxide
- Oxygen
- Sulfur Dioxide
- Formaldehyde
- Non-Methane Hydrocarbon
- Ammonia
- Ozone
- Methanol and Ethanol
- Chlorine Dioxide
- Ethylene

## Sensors

- Methyl Mercaptan
- Carbon Disulfide
- Tert Butylthiol
- Tetrahydrothiophene
- Benzene, Tolouene, Ethylbenzene, Xylene
- Phosgene
- Dimethyl Sulfide
- Electromagnetic Field
- Radiation Monitor
- Particulate Matter, PM 1, 2.5, 4, 10
- Helium
- Carbon Dioxide
- Methane
- Nitrous Oxide
- Total Volatile Organic Compounds
- Radon Gas
- Benzene
- Methane



# RADIUS® BZ1 AREA MONITOR

- SENSORS** : Up to 6 sensors (catalytic bead, photoionization detector, electrochemical, IR, and PID) Up to 7 simultaneous readings
- WARRANTY** : Two-year warranty, including sensors and battery
- KEYPAD** : Three buttons
- DATA LOG** : At least 3 months at 10-second intervals
- EVENT LOGGING** : 60 alarm events
- INGRESS PROTECTION** : IP66
- CASE MATERIAL** : Impact-resistant polycarbonate alloys
- DIMENSIONS** : 29 x 29 x 55 cm (11.5 x 11.5 x 21.5 in)
- WEIGHT** : 7.5 kg (16.5 lb)
- TEMPERATURE RANGE** : -20 °C to 55 °C (-4 °F to 131 °F)
- HUMIDITY RANGE** : 15% to 95% non-condensing (continuous)
- DISPLAY/READOUT** : 11.2 cm (4.4 in) monochrome backlit graphical Liquid Crystal Display (LCD)
- POWER SOURCE/RUN TIME** : Rechargeable nickel-metal hydride (NiMH) battery  
 7 days (168 hours) typical @ 20 °C, without Pump, with  
 Wireless  
 3.5 days (84 hours) typical @ 20 °C, with Pump, with Wireless  
 only,  
 30 days (720 hours) typical @ 20 °C, electrochemical sensors  
 without Pump, with  
**Wireless ≤8 hour recharge time**
- ALARMS** : 108 decibel (dB) at 1 m (3.3 ft) redundant audible alarms  
 Redundant, visual alarm LEDs (red and blue)



Sensors

Combustible Gases

Ammonia (NH<sub>3</sub>):

Carbon Monoxide (CO):

Chlorine (Cl<sub>2</sub>):

Hydrogen (H<sub>2</sub>):

Hydrogen Sulfide (H<sub>2</sub>S):

Hydrogen Cyanide (HCN):

Nitrogen Dioxide (NO<sub>2</sub>):

Oxygen (O<sub>2</sub>):

Sulfur Dioxide (SO<sub>2</sub>):

Phosphine (PH<sub>3</sub>):

Nitric Oxide (NO):

Carbon Dioxide (CO<sub>2</sub>):

Volatile Organic Compounds(VOCs)



# VENTIS® PRO5 MULTI-GAS MONITOR



**INDUSTRIAL  
 SCIENTIFIC**

- |   |   |
|---|---|
| SENSORS   | : Combustible Gases/Methane - Catalytic Bead<br>O <sub>2</sub> , CO, CO/H <sub>2</sub> low, H <sub>2</sub> S, HCN, NH <sub>3</sub> , NO <sub>2</sub> , PH <sub>3</sub> ,<br>Cl <sub>2</sub> - Electrochemical, CO <sub>2</sub> , CH <sub>4</sub> , CO <sub>2</sub> /LEL,<br>HC - Infrared |
| SO <sub>2</sub> ,<br>CO <sub>2</sub> /CH <sub>4</sub> , |   |
| KEYPAD  | : Two buttons for operation. Dedicated panic button.  |
| DATA LOG  | : At least 3 months at 10-second intervals  |
| EVENT LOGGING   | : 60 alarm events   |
| INGRESS PROTECTION                                      | : IP68 (submersion at 1.5 meters for 1 hour)  |
| CASE MATERIAL   | : Polycarbonate with protective rubber overmold   |
| DIMENSIONS  | : 104 x 58 x 36 mm (4.1 x 2.3 x 1.4 in) without Pump<br>172 x 67 x 65 mm (6.8 x 2.6 x 2.6 in) with Pump<br>104 x 58 x 61 mm (4.1 x 2.3 x 2.4 in) with wi-fi   |
| Battery   |   |
| WEIGHT  | : 200 g (7.05 oz) typical, without Pump<br>390 g (13.76 oz) typical, with Pump<br>243 g (8.5 oz) typical, with wi-fi Battery  |
| HUMIDITY RANGE  | : 15% to 95% non-condensing (continuous)  |
| TEMPERATURE RANGE                                       | : -40 °C to 50 °C (-40 °F to 122 °F) **   |
| DISPLAY/READOUT   | : Backlit liquid crystal display (LCD)  |

# Wireless Weather Station



Value	Range	Accuracy
Air Temperature	-40°F to 257°F (-40°C to 125°C)	±0.54°F (-40°F to 194°F) ±0.3 °C (-40°C to 95°C)
Relative Humidity	0 to 100%	±2% @ 77°F (25°C)
Rainfall	<b>0.001" (0.254mm)</b> resolution	<b>±2% at &lt;2" (5cm)/hour</b>
Wind Speed	0.1 to 200mph (0, 1 to 322 km/h)	±2mph (±3km/h) ±5%
Wind Direction	0° -359°, 1° increments	±3°
External Sensor Ports	6x2.5mm Stereo Jack (0to 3.0 VDC Analog Input)	
Operating Temperature	-22°F to 130°F (-30°C to 55°C)	
External Communication	Cellular, WiFi, Radio, Data Logger	
Power Source	3.5W Solar Panel, Rechargeable 6V/4.5AH SLA Battery	
Battery Life	14 Days Minimum Without Solar Power	
Data Capacity	312 Days at 15minute Intervals (30,000 Records)	
Dimensions	<b>12"H x 19.5"L x 11.25"W (30.5cm x 49.5cm x 28.6cm)</b> Add up to 7.25 (18.4cm) Depending on Antenna Used	

# Our Services



[www.amigosmyanmar.com](http://www.amigosmyanmar.com)

The screenshot shows the website's homepage with the following elements:

- URL: <https://www.amigosmyanmar.com/index.php/en/>
- Language flags: Myanmar and UK.
- Contact info: Phone 01-3566717, Email support@amigosmyanmar.com
- Logo: Amigos International Co., Ltd. with tagline "Trust, only one you can find here!"
- Search bar: "Choose categories" and "Search"
- Navigation: "ALL CATEGORIES" (highlighted), "HOME", "ABOUT US", "HIS"
- Category list:
  - Land Surveying Instrument
  - Surveying Instrument Accessories
  - GNSS DGPS (RTK) System
  - Soil And Concrete Testing Equipment
  - Water Quality Testing Equipment
  - Bathymetry Instrument
  - GPS Tracking System
  - Geotechnical Testing Equipment
  - Educational and Laboratory
- Main image: A group of people in a laboratory setting with the word "MYanmar" overlaid.

[www.facebook.com/](https://www.facebook.com/)

Amigos International Co., Ltd

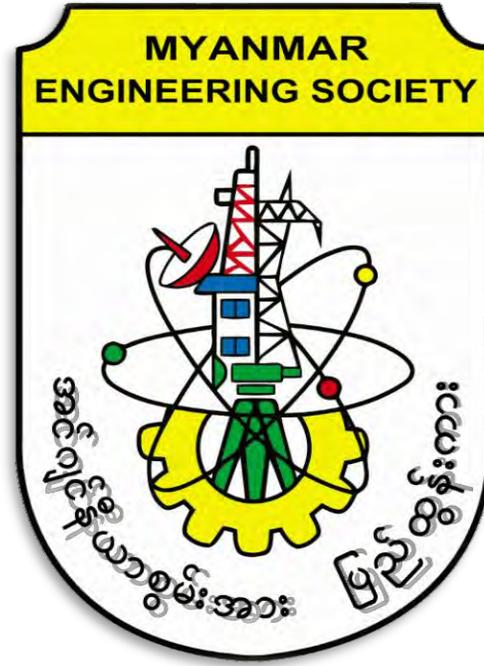
The screenshot shows the Facebook page for Amigos International Co., Ltd. with the following details:

- Header: "Trust, only one you can find here!" and [www.amigosmyanmar.com](http://www.amigosmyanmar.com)
- Profile picture: Amigos International Co., Ltd. logo
- Section header: **Amigos International Co., Ltd- Survey and Laboratory Testing Instruments**
- Page type: Local business
- Engagement: 66K likes • 66K followers
- Description: Land Surveying, Material Testing, Laboratory & Scientific Instruments
- Website: [amigosmyanmar.com](http://amigosmyanmar.com)
- Reviews: 96% recommend (39 Reviews)
- More info: See Amigos International Co., Ltd- Survey and Laboratory Testing Instruments's About Info
- Interactions: Liked, Message, and a menu icon.





# Questions



Thank You