

Air Sampling & Air Quality Glossary of Terms

AED

The aerodynamic diameter (of particles) usually expressed in microns (millionths of a meter).

Aerosol

A finely divided material suspended in air or other gaseous environment.

Air monitoring

Sampling for pollutants in the air using a variety of means such as sorbent tubes, bags, filters and sampling conventions.

Air pollution

The presence of contaminant or pollutant substances in the air that do not disperse properly and interfere with human health or welfare, or produce other harmful environmental effects.

Air quality monitoring

Sampling, measurement/analysis of airborne pollutants.

Air quality standards

The level of pollutants prescribed by regulations that are not to be exceeded during a given time in a defined area.

Airborne particulates

Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets.

Chemical composition of particulates varies widely, depending on location and time of year.

Airborne particulates include: windblown dust, emissions from industrial processes, smoke from the burning of wood and coal, and motor vehicle or non-road engine exhausts.

Alveoli

The tiny sacs of air in the lungs where gaseous exchange takes place. Oxygen is taken into the body and carbon dioxide is expelled.

Ambient air

Any unconfined portion of the atmosphere: open air, surrounding air.

Aromatic

A type of hydrocarbon, such as benzene or toluene, added to gasoline in order to increase octane. Some aromatics are toxic.

Asbestos

A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled.

Asbestosis

A disease associated with inhalation of asbestos fibres. The disease makes breathing progressively more difficult and can be fatal.

Aspirated

Forced airflow over or through a sensor.

Aspirated adaptor

An attachment to a sampling pump or other particulate monitor that includes a small motor driven fan to force air through the sampling head to ensure good readings when used in still air situations.

Asthma

A condition marked by labored breathing, constriction of the chest, coughing and gasping usually brought on by allergies.

Breathing zone

The volume within about 8 inches (200 mm) of the operator's mouth or nose.

Carbon absorber

An add-on control device that uses activated carbon to absorb volatile organic compounds from a gas stream. (The VOC's are later recovered from the carbon.).

Carcinogen

Any substance that can cause or aggravate cancer.

Chronic effect

An adverse effect on a human or animal in which symptoms recur frequently or develop slowly over a long period.

Chronic exposure

Multiple exposures occurring over an extended period of time or over a significant fraction of an animal's or human's lifetime (Usually seven years to a lifetime).

Compound

Chemical combination of different elements to form a substance where the compound atoms cannot be separated by physical means. Such compounds are not necessarily stable and may decay into other simpler compounds.

Concentration

The amount of a contaminant in a unit measurement. For example, the mass in grams of particulates in a standard cubic meter of volume of air. This is referred to as mg/m³ since there is not usually enough particulate present to get beyond a few tenths of a gram in mass.

Conical inhalable sampling head

The conical inhalable sampling head uses a 37mm GFA filter to collect samples of air in the breathing zone when used in conjunction with a personal sampling pump.

Contaminant

Any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil.

Cyclone head

A device that uses centrifugal force to remove large and heavier particles from polluted air. The smaller size particles pass up the cavity and are deposited on the filter membrane. Cyclones are designed to separate out the respirable size particles below about 4 microns such that the larger sized particles are not included in the measurement and are rejected by the sampling head.

Diffusion tubes

An inert tube of plastic or stainless steel that contains an absorbing matrix capable of collecting specific target air pollutants. The tubes are used for ambient air monitoring and sent to a laboratory for analysis.

Dust

Solid particles, usually produced by a mechanical process, with a range of particle diameters from 0.1 to 100 microns. Dust can also include fumes that condense from the vapour state usually from the volatilization of molten metals, high boiling liquids or combustion.

Filter cassette

A mechanical container designed to minimize the handling of the delicate filters used in sampling for particulates. Filter cassettes are available in various sizes such as 25 mm, 37 mm or 47 mm.

Filters

Can be made from glass fiber (GF/A) or mixed cellulose ester (MCE). Used to collect the particulates in the air when performing sampling conventions. Usually used in 25 or 37 mm diameter sizes.

Flow meter

A device used to verify the flow rate of a personal sampling pump used for sampling conventions to ensure stable and well-known conditions.

Gravimetric analysis

The determination of the mass concentration of particulates using pre and post weighed filters. The sample filter is weighed before the measurement and again after the dust sample has been collected in the cassette. The difference between the weights is the mass of dust/particulate collected during the sampling interval. The total volume containing the dust sample is obtained from the flow rate of the device (usually a personal sampling pump) by multiplying the flow rate in l/min by the time in minutes. This gives a volume in cubic meters. The concentration value is therefore the mass divided by the volume and is usually expressed in mg/m^3 .

Micron

A unit of length. One millionth of a meter or one thousandth of a millimeter. One micron equals 0.00004 of an inch.

Occupational exposure limits

8 hour time weighted average levels for each material under consideration. Limits are published by such bodies as OSHA, HSE etc. in each country.

Occupational exposure standards

These are standards applied to all materials and, in general, exposures below the standard would be regarded as demonstrating adequate compliance with the relevant statutory requirements.

Occupational hygiene

The science associated with the anticipation and recognition of workplace hazards and the evaluation and control of subsequent risks to health.

Organic

This means a substance that is carbon based.

Particulate

Can be an aerosol, mist, fog, dust, fumes or smoke depending upon the source.

Passive sampling

Air sampling without the aid of a sampling pump typically employing diffusion tubes.

Personal sampling

Occupational sampling of airborne contaminants in particulate form with sampling equipment worn by the operator. Measurements are normally taken in the breathing zone of the operator.

Personal sampling pump

A small battery operated device worn by a worker that draws air at a constant rate across a filter mounted in a cassette. By keeping the flow rate constant a known volume of air is sampled in a given time interval. For example, at 2 l/m flow rate a sampling pump will pull through 120 liters of air in 1 hour. The particulates in the air will be collected on the filter in the cassette and can be weighed at the end of the measurement to give a concentration in mg/m³.

PM2.5

Particulate matter having a mean aerodynamic diameter of 2.5 microns usually related to ambient air monitoring.

PM10

Particulate matter having a mean aerodynamic diameter of 10 microns usually related to ambient air monitoring.

Pressure drop

The differential pressure drop across a restriction, such as a sample filter in a cassette, normally measured in inches (or cm) of water.

PUF filters (PolyUrethane Foam)

Small cylindrical foam filters that can be inserted into the air stream when performing air sampling to limit the size of the average particles reaching the cassette or passing through an optical system.

Different sized foams are available to provide different cut values depending on the purpose required for the measurement. Typical pore sizes for the PUF filter foams are 10, 4 and 2.5 microns. A size selective adaptor will be required to hold the PUF filter in place.

Purge

To keep an air sampling system clean and monitoring correctly by providing a supply of clean air across the optical lenses to prevent contamination. If the lenses become contaminated the system will under read the true concentration levels encountered during the run.

Rotameter

Same as a flow meter for verifying the flow rate of a sampling pump.

Sampling bag

Used to collect gases and vapours during a measurement. Air is passed through the pump and enters an inert bag where it is collected for later analysis.

Sampling conventions

The size convention of particulate varies and is classified by how far they can travel within the breathing system of humans. Particles are classified by the D50 (or the 50th percentile of a distribution) as shown in the above family of aerodynamic diameters.

Short term exposure limit STEL

A 15 minute short term exposure limit rather like a TWA. If no STEL is quoted for a substance then a level 3 times the 8 hour TWA may be assumed but the total duration of the excursions should not exceed one hour in any 24 hour period.

Sick building syndrome

A widespread occupational health concern that is commonly associated with air conditioning systems in buildings. Symptoms vary but will normally include irritated eyes, nose and throat, headaches and lethargy.

Silicosis

A lung disease caused by excessive inhalation of crystalline silica dust.

Size selective adaptor

This is an adaptor for an air sampling system that allows dust particles of a certain size to be filtered out before arriving on the cassette or passing through the optical measurement system.

Sorbent tubes

Small tubes used to absorb sample gases and vapours. Contain one or more layers of sorbent material whose type depends on the gas/vapour to be sampled. Air to be sampled is drawn through the tube trapping the airborne chemicals. The tube can then be analysed in a laboratory to determine what substances are present in the sample.

Thoracic fraction

The mass fraction of inhalable particles penetrating beyond the larynx. Typically this will represent particles with a mean aerodynamic diameter of less than 10 microns.

Total inhalable fraction

The mass fraction of total airborne particles that are inhaled through the mouth and nose.

Vapour

A liquid or moisture diffused or suspended in air.

VOC

Volatile organic compound. Examples of VOC's are isobutylene and other hydrocarbons.

Volatile

This means a substance is easily converted into a vapour.