

## Sample How for What?

There are various potential contaminants out there in the workplace, and different Industrial Hygiene methods to evaluate exposures: let's look at a brief overview.

**Gas** refers to a contaminant existing at the molecular level, such as Chlorine or Carbon Monoxide; contrast this with "vapor" below. Gasses can be sampled with direct-reading items like Detector Tubes, which offer an instantaneous - and fairly accurate - result. One can also use an impinger; which is a glass tube containing a liquid that the gas is bubbled through via a battery-powered pump. There are also some direct-reading badges that can be used to assess exposure to certain gasses, with varying accuracy.


**Vapor** is defined (by an industrial hygienist) as an airborne material that has evaporated, such as from a solvent: Methylene Chloride, Ethanol etc. Depending whether the solvent is "polar" or not, (see *Wikipedia*) capture is done with glass tubes containing Charcoal or Silica Gel, also using a pump. In some cases there are passive "badges" which can be worn. The beauty of a badge, of course, is there's no batteries or pump to fail, and no real calibration needed. These organic vapor samples are usually analyzed by Gas Chromatography or similar methods.

**Mist** may start out as a liquid vapor being generated, but usually the particles or droplets condense into larger sizes, often producing a visible fog. Oil mist is one of these industrial contaminants, and is sampled by a filter, which is dried (water removed) and weighed to assess oil.

**Fume** is usually defined as that from metal operations, such as welding or torch cutting, where there are tiny bits of elemental metal that condense into larger - albeit almost microscopic - airborne particles. Sampling is usually done on a filter and a pump, with digestion and analysis by Atomic Absorption Spectroscopy specific for the metal(s).

**Dust** is generated by the mechanical abrading or grinding of something, resulting in tiny pieces that become airborne. The key thing here - besides the material itself - is the size of the particles. Many materials have separate exposure values for respirable and non-respirable particles. To sample for respirable dust, usually a miniature cyclone with a pump is involved; just like a dust collector cyclone, but on a far smaller scale. The cyclones size-selects particles and provides information on those less than 5  $\mu$ , which are considered more of a hazard to the deep lung.

**Fibers** refer to man-made (ceramic) or natural (asbestos) fibers, with a length-to-width ratio of at least 3 to 1. These are sampled using a pump/filter; the filter is dissolved and the fibers are counted using a microscope. The results are provided in fibers per cubic centimeter of air (f/cc).

**Mold** or mold spores can be sampled with pumps/filters to assess the amount in the air, or with wipe or contact methods for surfaces. However, no federal standards exist, and mold is ubiquitous: sampling may not be necessary. OSHA advises to *not* sample, but find the water leaks causing the mold, and clean it properly with a disinfectant. 

## App Corner - Time Calculator

Here is a "one trick pony" sort of Apps; very simple, only does one extremely useful thing, and is very inexpensive.

*Time Calculator* [Rolf Assfalg] is a great App for Industrial Hygiene sampling. This is because the total sampling time - in minutes - is necessary to calculate things like total volume or exposure time, and I've yet to meet an IH (myself included) who didn't at one time or another do an hours: minutes subtraction incorrectly. 