



TO-15: - How To Read and Interpret Your Report

When scanning your results, the rows which are highlighted in yellow indicate that compound was found in the sample. Results are reported in both parts per billion volume (ppbv), and is also expressed in micrograms per cubic meter (ug/m³) which is the concentration in weight of the substance per volume of air.

Common Indoor Contaminants;

Chemical	Common Indoor Uses	Typical Concentrations	OSHA PELs
Ethanol	beverages, cleaners, disinfectants, perfumes, paints, and lacquers	25 to 400 ppb	1,000,000 ppb
Isopropanol	cleaners, disinfectants, quick drying inks, alcohol swabs, and perfumes	50 - 200 ppb	400,000 ppb
Acetone	cleaners, inks, nail polish remover	2 to 20 ppb	1,000,000 ppb
2-Butanone (MEK)	cleaners, disinfectants	2 to 20 ppb	200,000 ppb
Ethyl Acetate	cleaners, disinfectants	2 to 20 ppb	400,000 ppb
Freons, various	Refrigerants, propellants, foam blowing agents	1 to 10 ppb	1,000,000 ppb
Toluene	Paints, inks, solvents, gasoline	2 to 10 ppb	200,000 ppb
Xylenes	Paints, inks, solvents, gasoline	2 to 10 ppb	100,000 ppb

Freons are common refrigerants and often seen in air samples. Elevated levels of freons can indicate leaks from refrigerators and air conditioners. Aerosol sprays and foam products also contribute freons and / or propanes and butanes to indoor air.



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Benzene, toluene, ethylbenzene, and xylenes are components of gasoline.
Toluene and xylenes can be found in solvent based products such as oil based paints.

If a Library search is indicated, normal and substituted hydrocarbons in the octane to dodecane (C8 to C12) range can indicate the presence of diesel oil, fuel oil, or mineral spirits. Unknown hydrocarbons often indicate weathered petroleum compounds from old spills. Aldehydes, many of which have objectionable odors at low levels, can be a result of incomplete natural gas or LP gas combustion, used in building and furnishing materials, or the presence of decaying organic matter. Limonene and Pinene are found in citrus and pine-based cleaners.

If you wish to compare your data with NIOSH or OSHA exposure limits, please consult the following links and search for the individual compound of interest;

<http://www.cdc.gov/niosh/npg/>

http://www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html

In addition, you can contact the TO-15 Laboratory for other available reporting formats.

If you have additional questions about your report, please do not hesitate to contact Marge Howley, TO-15 Laboratory Manager at (800) 220-3675 ext. 2807 or Vince Daliessio CIH, Industrial Hygiene Project Manager at (800) 220-3675 ext. 2559.

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TO-15 Results – Frequently Asked Questions (FAQ):

Q:What does an “ND” in the result column next to a compound mean?

A: A “ND” (not detected) means we did not detect that compound in the sample.

Q:What does an “E” in the “Q” (qualifier) column next to a compound mean?

A: An “E” (estimated) qualifier means that the concentration reported was higher than the calibration curve. “E” is commonly reported for only for ethanol and isopropanol which are not required to be diluted per TO-15 method. There are some instances where the lab will report an “E” for other compounds such as a sample that has a short turn around time and no time to make dilutions.

Q:Why are there values listed in the “Results ppbv” and “Results ug/m3” columns for that compound if it was not detected?

A:When a compound is not detected, the value for ppbv and ug/m3 is the Reporting Limit (RL) for that compound, that is, it *could* be present at less than the values stated, but those values are as low as we are able to report under normal circumstances.

Q:Why do the listed ppbv and ug/m3 values differ for undetected compounds?

A: Different compounds can have different detection limits. Most compound RLs are reported at 0.5 ppbv, however some very common compounds are reported slightly higher. This is often a function of what other similar compounds are present, or how much of a particular compound is present. The ug/m3 RLs vary due to the different molecular weights of each compound.

Q:Why are there different numbers in the “Results ppbv” and “Results ug/m3” columns?

A: They are two different ways of expressing an air concentration, ppbv is a volume / volume concentration, while ug/m3 is a weight / volume concentration. If you know the concentration in one unit, and the molecular weight of the compound, you can easily convert it to the other, e.g.;

$$\mathbf{X \text{ ppbv} = (Y \text{ ug/m}^3) \times (24.45)/(\text{molecular weight})}$$

$$\mathbf{Y \text{ ug/m}^3 = (X \text{ ppbv}) \times (\text{molecular weight})/24.45}$$

(24.45 is the gas molar value, a constant)



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Q:What is meant by the “Method Detection Limit”?

A: The Method Detection Limit (MDL) refers to the non-zero amount of the compound in question that we can identify in a scientifically-sound manner. Essentially we have to be able to see a peak on the chromatogram that is higher than three times the standard deviation of the same peak in the blank. If it does not meet this minimum, we cannot say we detected it. The values found on your Form 1s are “Reporting Limits” (RLs) which are higher than MDLs.

Q:Where can I find (gasoline, diesel, fuel oil, natural gas, propane, LPG) in my sample?

A: These materials are mixtures of several different compounds. Because the analysis identifies molecules, these mixtures are elucidated indirectly. Additionally, each of these mixtures contain one or more compounds that are characteristic of other mixtures, for example, gasoline contains n-hexane, n-heptane, benzene, toluene, ethylbenzene, and xylenes, as does diesel fuel, though diesel fuel also contains other, heavier hydrocarbon molecules.

Similarly, LPG, also known as liquefied petroleum gas (often referred to interchangeably as “propane”) may contain propane, but also many other light hydrocarbon molecules, including some found in gasoline too. Identifying which mixture goes with which compounds is a bit of an art, and requires some background information to do accurately.

Q:What does “RT” mean on my Library Search results?

A: RT stands for Retention Time, referring to the length of time from the injection of the sample into the GC column to when a particular molecule exits the column and passes into the Mass Spectroscopy detector.

Retention time is a function of molecule size and mass, the functional groups attached, and the polarity of the molecule relative to the column packing, and is characteristic, meaning every organic molecule has an associated retention time that assists in identification. In general, smaller, lighter, less polar molecules elute first, and larger, heavier, more polar ones elute later.

Q:What is an “unknown” in the Library Search?

A: This means a compound eluted from the GC column and was detected, but that its ion fragmentation pattern was not close enough to any peak in the library to identify it.

Q:Why are all of my Library Search compounds qualified as “Estimated”?

A: Because the instrument is not calibrated for these compounds, we can only estimate and tentatively identify them. However, this is usually fine for indoor air quality testing.