The effects of humidity on Indoor Air Quality

Volatile organic compounds (VOCs) are emitted as gases that contain a variety of chemicals, some of which may have long-term adverse health effects.

While VOCs may be found in household sources including paints, varnishes, cleaning products furnishings and air fresheners, concentrations of VOCs are up to ten times higher indoors than outdoors; therefore, creating a negative impact on the quality of air indoors.

Studies from the EPA indicate that while products containing organic chemicals are being used, the users can expose themselves and others to high pollutant levels and elevated concentrations can persist in the air post activity completion.

Although the ability of VOCs to cause health effects varies greatly from those that are highly toxic to those with no known health effect, both short- and long-term health is at risk.

There are many key signs or symptoms associated with exposure to VOCs: nose and throat discomfort, nausea, headache, fatigue, dizziness and an allergic skin reaction. However, long-term effects include

damage to liver, kidney and central nervous system, visual disorders, memory impairment and cancer.

As these chemicals can be extremely hazardous to human health within various industries, proper detection is essential to mitigate exposure. When air quality monitoring is non-negotiable, ION Science offers various gas sensors and components that provide humidity resistance and anti-contamination design for optimal performance.

To learn more about our VOC gas sensors specialising in the continuous monitoring of indoor air quality,contact ION Science on info@ionscience.com.

Pre-filter Tube Discoloration and Re-Use of Tubes

Figure 3 shows how VOCs (volatile organic compounds) turn the tube to a greenish-brown color as the reagent is consumed. Ion Science recommends that a new tube be used with each tube measurement for best accuracy and performance. Tubes can be re-used for more than one short-term (~2 min.) measurement provided that the tube has not been exposed to high humidity, and tube discoloration has not exceeded the ¾ mark indicated on the tube, as below, to prevent interference in the benzene reading. Please note, however, that the re-use of tubes is done so at the user's own risk. If tubes are re-used it is important that they are purged in clean air for two minutes, to remove any benzene from the tube before starting another benzene measurement. Never use a tube for more than one 15-minute STEL even if there is no discoloration of the tube or the displayed reading is zero. The Tiger Select should not be stored with tubes connected.

Humidity Considerations

Variations in humidity do not affect the benzene readings because the tube absorbs moisture from the air. However, tubes that have been open to the ambient air for more than an hour or have been used for multiple air samples will turn a dull orange colour and have reduced capacity for removing organic interferences.

CAUTION: Do not use tubes that have excessive moisture absorbed onto them, as liquid acids may be drawn into the instrument, causing corrosion and severe damage to the PID. Again, it is always safest to use a new tube for each measurement, and never use a tube for more than one 15-minute STEL to avoid liquid acid formation.

How Well Does the TAC Reading Correlate to Actual Total Aromatic Hydrocarbons?

The Tiger Select can be used in TAC mode to screen for total aromatic hydrocarbons before applying a pre-filter tube to measure benzene selectively. Figure 4 shows the calculated TAC response on a 10.0 eV lamp for a typical gasoline mixture. About 80% of the response is due to aromatic compounds, while 20% is due to alkanes and other compounds. Thus, TAC gives a reasonable upper limit estimate of true total aromatic hydrocarbon concentrations when measuring gasoline-type samples. Table 4 shows a similar agreement for the Standard Mixture of hexane, heptane & toluene, which simulates gasoline. However, there was no agreement for the Calibration Gas Mixture, which contains more olefins than aromatics. These olefins, like propene and butadiene, respond on the 10.0 eV lamp when no pre-filter

tube is present, and thus the so-called TAC reading is not representative of the aromatic concentration. Nevertheless, a high TAC reading is useful in that it provides an upper limit and thus a warning signal to insert a tube to measure benzene selectively.

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