FTIR ETG 9500 for Toxic and Harmful Gas Monitoring System in Fire Fighting

FTIR analyzer with instrument holder backpack

Physiological Response to Various Toxic Products

The toxic products responsible for fire deaths are usually not known because detailed pathological examination of fire victims is rarely conducted. Some information on the pathological response of man to various harmful gases and vapours produced at fires is available.

Carbon monoxide (CO)
is produced as a result of incomplete combustion of materials containing carbon and is present in large quantities at most fires. Carbon monoxide that is inhaled causes asphyxiation by combining with haemoglobin in a reversible reaction to form carboxyhaemoglobin

INTRODUCTION

In recent years, there has been a high incidence of fire accidents in petrochemical areas and dangerous chemical storage ports.
In particular, in recent years, a number of major safety incidents have caused significant casualties and huge economic losses, which have caused great negative impact on society. Fire accidents in petrochemical areas and ports where hazardous chemicals are stored are typically characterized by the release of large quantities of toxic and harmful gases at the scene [1,2]. The presence of toxic and harmful gases has made it more difficult for fire fighters to carry out fire fighting and rescue in such scenes, and has also posed a great threat to the safety of the combatants at the scene. Therefore, the study of toxic and harmful gas monitoring systems is of great significance for early warning of fire and ensuring the life safety of field combatants.

Smoke and toxic gases and vapours usually occur together at fires and it is difficult to distinguish clearly which product of combustion is responsible for the harmful effects. Before discussing them, smoke, gas and vapour should be defined as these terms are used in the present Digest. Smoke is particulate matter consisting of very fine solid particles and condensed vapour. It constitutes most of the visible part of the products of combustion observed at a fire. Gas is a product of combustion that remains a gas even when cooled to normal building temperatures. Vapour is a product of combustion that is gas when produced but reverts to solid or liquid at normal temperatures. Vapours will gradually condense on cool surfaces as they migrate from the fire.

Carbon dioxide (CO_2)
is produced in quantity at most building fires. Inhalation of carbon dioxide stimulates respiration and this in turn increases inhalation of both oxygen and possible toxic gases and vapours produced by the fire

Hydrogen chloride (HCl)
is produced when polyvinyl chloride (PVC) is decomposed at fires. If inhaled, HCl will damage the upper respiratory tract and lead to asphyxiation or death.

Nitrogen Dioxide
There are three common oxides of nitrogen: nitrous oxide (N_2O), nitric oxide (NO), and the two forms of the dioxide (NO_2 and N_2O_4). Nitrogen dioxide, which is very toxic, can be produced from the combustion of cellulose nit**rate.**

Formation of Toxic Gases and Vapours
The quantities of toxic gases and vapours produced by combustion depend on the material involved and the environmental condition. Some are already known; others can often be predicted from a knowledge of the chemical composition and molecular structure of organic compounds.

Acrolein
is a highly toxic, reactive, and irritating aldehyde that occurs as a product of organic pyrolysis, as a metabolite of a number of compounds, and as a residue in water when used for the control of aquatic organisms. It is an intermediate in the production of acrylic acid, DL-methionine, and numerous other agents. Its major direct use is as a biocide for the control of aquatic flora and fauna. It is introduced to the environment from a variety of sources, including organic combustion such as automobile exhaust, cigarette smoke, and manufacturing and cooking emissions, as well as direct biocidal applications.

Hydrogen Cyanide (HCN)
Smoke that is present during a structure fire is composed of several irritating, toxic and asphyxiant chemicals, depending on the materials that are burning. These chemicals may include hydrochloric acid, ammonia, carbon dioxide, carbon monoxide, hydrogen sulfide and hydrogen cyanide. According the U.S. Fire Administration (USFA), smoke is the killer in 60% to 80% of all fire deaths. Recent research has revealed that hydrogen cyanide present in smoke generated at building fires may play a more significant role in injuries and deaths of firefighters and civilians than once thought.

With ETG's FTIR 9500 gas analyzers, it is possible to measure more of 30 gas components simultaneously, and there is no need for separate sampling. This creates immense time savings as the results can be viewed immediately. Avoiding separate sampling is also cost-effective as no consumables are required for the sampling process. Being able to analyze the samples later for any unknown components with the help of our vast sample library helps identify and quantify all possible threats. The wireless operation ensures the safety of the user in different scenarios, for example, when facing hazardous materials incidents. The quick set-up and ability to get results in seconds help users make informed decisions on the field.

With FTIR ETG 9500 P you will have a lab at your site

The ETG FTIR 9500 P is full of features, in a tiny but robust package. A high sensitivity sample cell for lowest possible detection limits, multicomponent capability and a built-in-pump, so no need for a separate sampling system. This portable gas analyzer is also lightweight (8.5 kg), splashproof (IP54 rated) and battery-powered providing unmatched portability for such a powerful analyzer. Designed for demanding on-field use, the FTIR ETG 9500 P is the perfect tool for a wide variety of applications. To read more about different use cases, head to environment or health and safety- application page.

MAIN FEATURES

- Easy to use
- Simultaneaus gas monitoring
- Wireless communication
- Wide spectra library
- Battery powered
- 24 months warranty
- Built in sample pump
- Integrate dust filter
- Rugged case
- IP 54 Waterproof
- Gases library available
- Fast tutorial included for easy start up
- Product Made in Italy
- Wide variety of application
- FTIR ETG 9500 can to measure :
- Inorganic gases: Water, CO_2, CO, NO, NO_2, N_2O, NH_3, SO_2, HCl, HF, ...
- Volatile organic compounds: hydrocarbons, alcohols, aldehydes, ketones, freons, ...

The main exceptions are:

- noble gases (He, Ar, ...)
- metals (Hg, ...)
- molecules with just two atoms of the same element (N_2, O_2, H_2, Cl_2, ...)
- molecules with very small dipole moment change (H_2S, ...)
- low volatility organics (high boiling point or room temperature solid)
- particulate matter or aerosols (not a gas)

FAQ

How are new gases added to the library?
New gases can be either measured with the instrument in question or imported from a generic library. The best method depends on the application; if traceability is required,
instrument specific calibration is the best option, otherwise generic spectra may be used. Instrument specific calibration can be performed by the user or by the ETG calibration laboratory.

What are the detection limits for commonly measured gases?
The ETG FTIR gas analyzers can measure from low ppm levels up to vol-% with subppm detection limits for almost all gases. Exact detection limits depend on the type of sample cell and detector used. Please contact ETG or your local distributors forperformance data on your list of target gases.