Measuring the concentration of carbon monoxide using gas detection tube - lab rep...

Science, Chemistry

Measuring the Concentration of Carbon Monoxide Using Gas Detection Tube

The paper " Measuring the Concentration of Carbon Monoxide Using Gas Detection Tube" is a perfect example of a lab report on chemistry. Gas detector tubes by definition are thin glass tubes with calibration scales printed on them whereby the concentrations of the substance (vapors and gases) that is to be measured is directly read. Each tube has a specific matrix such as gel, alumina, and silica which have the capacity of binding the target substance to produce a layer of color change that is distinct. The carbon monoxide appears in the lungs then crosses the capillary membrane into the alveoli, at this point, it is expired during breathing. This expired CO is then collected with Quintron collection devices and analyzed on the gas detection tube (accuro-bellows-hand-pump tube). In this case measurement of exhaled carbon monoxide level could give an immediate and a method that is non-invasive for examining exposure to carbon monoxide status. The main objective of this experiment was to use a gas detection tube (accuro-bellows-hand-pump tube) which is a portable CO monitor to determine the level of CO exposure during the electronic arc welding process. For instance, it could be comparing the exhaled carbon dioxide levels in non-exposed and exposed individuals. CO is known to be lethal poison and it is generated when fuel like propane or gasoline are burned. It’s one of several chemicals found in the engine exhaust that results from combustion that is incomplete. Since CO is odorless, colorless and tasteless gas, it might overcome the person exposed without warning.

Objective: To detect the concentration of carbon dioxide generated by the

electronic arc welding process

Instruments and materials

Sampling pump,

Detector tube,

Airflow indicator

One pack of the battery pack and ampoules packed in a plastic case.

Methodology

Sample air was manually aspirated into the detector tube through pulling of the sampling pump. For our case, the air sample was drawn through the Drager tube with the use of strokes. After releasing the bellows, the air was drawn automatically and the gas sample which was to be measured was sucked through the tube that was being used. The process of sampling was completed at the moment when the pump’s body had opened completely. The stroke end is marked by a pressure-controlled display on the Drager accuro pump’s body. The tube needs to be replaced with a fresh one as well as the sample with the standard volume (half amount)

Results

The system has 2 components that include the analyzer and a substance-specific chip. Every chip has 10 capillaries filled with a special reagent that is enclosed in a hard plastic casing. The operator is able to alternate between various gas measurements using various chips. The analyzer employs electronics and optics in the evaluation of the chemical reaction within the capillary; it finds a measurement value as well as displays the results in a digital readout.

Conclusion

CO is known to be lethal poison and it is generated when fuel like propane or gasoline are burned. It’s one of several chemicals found in the engine exhaust that results from combustion that is incomplete. Since CO is odorless, colorless and tasteless gas, it might overcome the person exposed without warning (Sax, 1975). The results show that direct reading monitor is an excellent means for sampling and analyzing carbon dioxide if calibrated appropriately and if the airflow isn't directly monitored sensor’s face (linear flow) The monitor must be calibrated based on the manufacturer-stated flow settings. The turbulent flow at the sensor’s face does not generate the magnitude of positive bias that occurs during linear face velocity tests (National Institute for Occupational Safety and Health, 1972). At least five hundred substances can be detected as well as measured using a Drager tube system. The typical applications of these Drager tubes include emission measurement, COSHH monitoring, compressed breathing air taking quality control, process control as well as emergency response and environmental monitoring. It is known that the use of the Drager tube system, gas detection has been made easier unlike a piston pump; accuro pump does not need any lubrication. It’s made of nonmetallic and corrosion-resistant materials. It cannot be bent so easily by rough handling. It is known to withstand harsh conditions. Breath analysis was rapid and the results correlate well with CO exposure