MODERN Breathalysers

http://www.drinkdriving.org/drink_driving_information_breathalysers_modern.php

MODERN BREATHALYZERS

Introduction | Early Breathalysers | Modern Breathalysers

Type Approved Breathalysers | Home and Work Breathalysers | Breathalysers For Sale

Enormous advances in breath testing technology have been made since the introduction of early breathalysers in the 1930's. Breathalysers these days are more or less completely automatic and are designed to be virtually operator proof to eliminate human error.

ELECTROCHEMICAL FUEL CELL BREATHALYSERS

Electrochemical fuel cell breathalysers are devices in which an electrical current is produced as a result of a chemical reaction taking place on the surface of an electrode system. The oxidation of alcohol/ethanol to acetaldehyde is carried out in a fuel cell consisting of a deposit of gold and platinum on a porous disc. The chemical reaction that takes place converts any alcohol into acetic acid, this conversion produces a fixed number of electrons per molecule of alcohol.

The small electrical current produced by the alcohol in a persons breath reacting on the electrode within the machine can be used to give a digital display, move a needle or trigger certain lights on the device, depending on the amount of alcohol detected. Fuel cell technology is particularly suitable for portable screening devices, due to the small size of the cells and the low power requirements of the technology.

The **majority of handheld screening devices used by law enforcement officers use electrochemical fuel cell technology**. Fuel cell breathalysers provide accurate results but are quite expensive to manufacture.

Advantages:

- Sensor is highly specific and sensitive to alcohol
- The alcohol measurement cannot be influenced by endogenous substances such as acetone (*produced by diabetics*), Carbon Monoxide or Toluene
- Long life term (*approximately 5 years*)

Disadvantages:

- Cannot detect if breath sample was alveolar (*deep lung air*). As a result it may produce a falsely high reading if a subject has recently drank and still has alcohol in his mouth (*highly unlikely as mouth alcohol evaporates very quickly)*.

INFRARED OPTICAL SENSOR BREATHALYSERS

Infrared optical sensor breathalysers use infrared spectroscopy which identifies different molecules based on the way they absorb infrared light. Molecules constantly vibrate and the vibrations change when they start to absorb infrared light.

Molecules contain what are known as bonds and each type of bond will absorb infrared light at different wavelengths. A photocell is used in the machine to detect how much infrared light any ethanol bonds have absorbed. The photocell then produces an electrical pulse depending on how much infrared light has been absorbed. The electrical pulse is then sent to a microprocessor within the machine which calculates a persons BAC level based on how much light has been absorbed.

Breathalysers utilising infrared optical sensor technology are extremely accurate and the technology is particularly suited for desktop evidential breathalyser machines.

Advantages:

- Ensures that the breath sample was alveolar (*deep lung air*)
- Provides pinpoint accuracy and therefore used for evidential purposes
- Can detect the presence of mouth alcohol
- Does not have a limited life expectancy and will remain stable for many many years (*although they are still regularly calibrated and checked when used for law enforcement*)

Disadvantages:

- Machines that adopt IR technology are larger in size and are not suitable for portable handheld operation.

DUAL SENSOR BREATHALYSERS

Many evidential desktop analysers are dual sensor systems. Adopting both infrared and electrochemical sensors (***EC/IR***). This way two independent measurements are taken from the same sample of air ensuring that all readings are 100% accurate

SEMICONDUCTOR BREATHALYSERS

Semiconductor breathalysers measure the level of alcohol present in a breath sample based upon the change in resistance upon the semiconductors inside the machine. The semiconductors produce a small standing electrical current. When alcohol comes into contact with the semi conductor, it is absorbed on the surface of the semiconductor, changes the resistivity and hence changes the electrical current. This gives an indication to the amount of alcohol present in the breath sample.

The surface effect by which they operate is dependant on the atmosphere. There sensitivity to alcohol can vary depending on the climate and altitude when the test is carried out.

Semiconductor technology is used mostly in consumer models of breathalyser due to the varying degrees of sensitivity to alcohol in different atmospheres. They are also relatively cheap to manufacture.

Advantages:

- Small in size and cheap to manufacture
- Available in convenience stores and mail order catalogues

Disadvantages:

- Sensor can be unstable
- Highly sensitive to the atmosphere. Carbon monoxide, cigarette smoke and many other environmental gases can effect the readings produced
- Changes in sensitivity results from changes in altitude and elevation
- Sensitive to changes in temperature, humidity and breath flow patterns

Obviously these devices cannot be used by law enforcement agencies. Although they can produce reliable results in the right conditions depending on the quality of the device in question. The mass production of very poor quality novelty devices use this technology.

Introduction | Early Breathalysers | Modern Breathalysers

Type Approved Breathalysers | Home and Work Breathalysers | Breathalysers For Sale