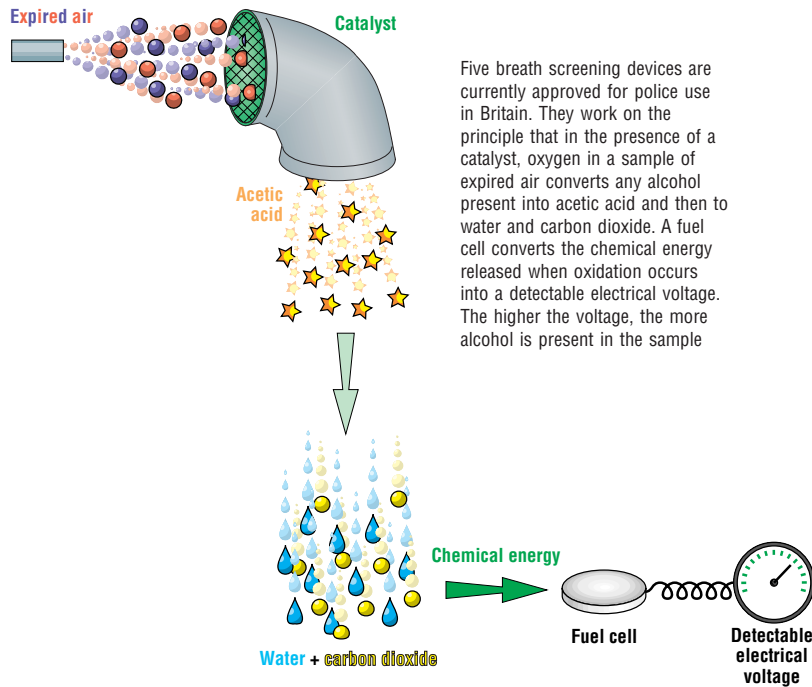


How Does it Work?

Alcohol breath testing



Five breath screening devices are currently approved for police use in Britain. They work on the principle that in the presence of a catalyst, oxygen in a sample of expired air converts any alcohol present into acetic acid and then to water and carbon dioxide. A fuel cell converts the chemical energy released when oxidation occurs into a detectable electrical voltage. The higher the voltage, the more alcohol is present in the sample



- Drivers are initially tested for alcohol impairment at the roadside with a screening device. If this produces a positive test, evidential breath testing is performed at the police station. Motorists can be stopped and required to take a breath test by police at the scene of a road traffic accident, if a police officer suspects a motorist may be driving under the influence of alcohol, or if a motorist commits a moving traffic offence.
- Screening devices are about the size of old fashioned mobile phones. The driver blows into a disposable mouthpiece for each test. The whole process takes about a minute for the device to record the result. Screening devices offer four result categories: “zero,” “pass,” “warn,” and “fail”. Anyone who fails the test is arrested and is required to perform an evidential breath test at a police station.
- A sample of the ambient air is tested as a blank check. This is followed by a check sample of an air/ethanol standard. This checks the calibration of the device. The concentration of alcohol in the standard sample is 35 µg/100 ml air, which is the UK drink-driving limit. Two samples of breath are then taken from the motorist and tested, each separated by a sample of air. The test ends with a final air and standard check.
- If the results from the two actual samples differ by 15% or more of the lower reading or 5 µg, whichever is the greater, the device

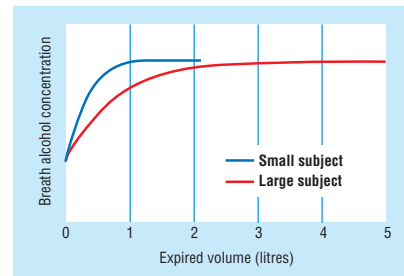


There are three types of approved evidential devices. They are the size of a large printer with an attached keyboard and a small liquid crystal display with a facility for printing out the result

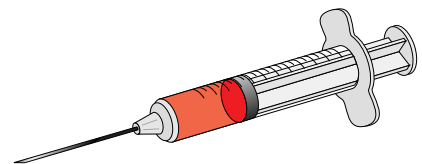
records an error message. The driver is then asked to provide a sample of blood or urine for laboratory analysis. If the lower of the

two results lies between 40 µg and 50 µg/100 ml breath, the driver has the right to ask for a blood sample. If the lower result is greater than 50 µg/100 ml breath, the driver is prosecuted.

- Devices used for evidential breath testing use either a fuel cell (as with the screening devices) or an infrared cell. An infrared cell directs infrared energy through the sample and any unabsorbed energy at the other side is detected. The higher the concentration of ethanol, the more infrared absorption occurs (in much the same way that a sunglass lens absorbs visible light, alcohol absorbs infrared light).
- Accuracy depends on the sample of breath being deep lung air (alveolar air). As the driver breathes out, the device continuously monitors the expired air using an infrared cell. The concentration of ethanol climbs as expiration continues, and when the level of ethanol stabilises, the sample of breath is analysed. This ensures accurate alcohol readings and means that the volume of air each person has to blow will depend on how large his or her lungs are.



- Alcohol in the mouth gives a rapid peak in ethanol concentration on the evidential test. If the infrared cell that monitors the breath alcohol profile detects such a peak the test is aborted and a blood sample is required instead.
- These devices sometimes register “interfering substances.” If this happens the test is aborted and a blood sample is required.



The maximum level of alcohol that may be accurately detected by evidential breath testers is 220 µg/100 ml air. The whole process takes 10 to 15 minutes with the fuel cell based instrument, and up to 5 minutes with the purely infrared based ones.

For more information: www.forensic-science-society.org.uk

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