

## WHITE PAPER SERIES



## SUBSTANCES THAT CAN AFFECT A BREATH TEST

### ABSTRACT

Even the most accurate Blood Alcohol Content (BAC) breath testing devices can be affected when the subject's breath contains alcohol - not ingested by drinking, but through ingestion of other interfering substances. This can lead to undesirable outcomes in legal, employment, family and community terms.



## INTRODUCTION

Breathalysers are designed to detect the presence of alcohol to assess probable cause for arrest or punitive action. The use is covered in AS 3547 — 1997 Breath alcohol testing devices

A person testing with readings over permissible levels, including zero tolerance contexts in some industries, may claim they have ingested no alcohol prior to testing. Such claims are often regarded as desperate attempts to thwart legal or punitive action — or may be seen as simply unwarranted, obstructive or frivolous.

But there are some instances of BAC results not caused by ingesting alcohol for the matter to receive more detailed attention.

Even a high quality, state-of-the-art fuel cell breathalyser can show a reading but it should be remembered the fuel cells in quality devices have been optimized to be sensitive to ethanol only.

The need for awareness of how positive results are triggered in a Breathalyser testing is important for effective and accurate results, especially in industry AOD detection programs where zero tolerance criteria often apply.

Implementing good policy and processes regarding the use of Breathalysers will mitigate the risk of improper use.

## UNDERSTANDING PASSIVE TESTING & MOUTHPIECE TESTING

Passive testing involves no contact between the subject and the testing device. It involves the subject simply talking or blowing across the breathalyser; it is popular, particularly for zero tolerance sites implementing blanket testing of all workers prior to sign-on.

Any result other than zero simply indicates that further investigation is required to determine accurate BAC levels. Mouthpiece testing requires the subject to blow into the device; this requires the use of a consumable mouthpiece for each subject.

There are two major breathalyser technologies: semiconductor and fuel cell. The fuel cell, as used by police is more accurate. Breathalysers using a semiconductor are subject to false positives caused by substances like ketone, cigarette fumes, diabetics' breath even hair sprays and mouthwashes.

On the other hand, fuel cell breathalysers, such as those provided by Alcolizer Technology, when properly calibrated and used correctly are extremely accurate and reliable.

# SUBSTANCES THAT CAN CREATE FALSE POSITIVES

## 1. Medications

Typically these can include cold/flu liquid mixtures, allergy pills, prescription drugs, breath fresheners, asthma inhalers, scented products used near the mouth (like aftershaves) and mouthwashes. The reading can be worsened by the combined presence of mouth alcohol and breath alcohol. Some medicines taken orally could contain alcohol; even the small amounts involved could affect a BAC test.

As is the case in all Australian Police operations, a 15 minute gap should follow any failed active test, before a confirmatory test is taken. For industry, a 15 minute withholding period should follow a failed passive test before an active test is conducted. If passive testing is not used, a 15 minute withholding period after an initial active test should be followed by a second active test to eliminate the possibility of any mouth alcohol or other substances recently ingested substances affecting the result.

Company policy should dictate a withholding period if workers claim to have ingested foods or smoked cigarettes in the previous 15-minutes.

## 2. Medical Conditions

High concentrations of acetone can be found in diabetic breath due to the breakdown of fats rather than glucose. The levels observed can be 1000 times greater than in a non-diabetic patient. Even at these elevated concentrations there is very little response on a fuel cell. (Note this is not the case with a semiconductor Breathalyser which would produce a significant response). Hypoglycemia can also cause symptoms similar to intoxication, including dizziness, clumsiness and confusion.

## 3. Mouth Alcohol Presence After Drinking

When an alcoholic drink is ingested, some of the alcohol lodges in the lining of the mouth. This can exaggerate the BAC reading, making it higher than the actual blood alcohol content.

Australian police have used 15 minutes and this is been proved to be sufficient for mouth alcohol to dissipate in alcohol positive subjects as noted in a paper by Sterling K J. Forensic Sci. 57 (3) 802-805 (2012)



## 4. Certain Types Of Food

This mainly depends on whether alcohol is either produced from the foods or is present in them, for example included in meal preparation. When wine is used in cooking, the alcohol is burnt off. But when liqueurs are added to deserts, for instance, the ingestion of alcohol equates to drinking it.

It has been said that in cooking a pizza, the yeast present in dough can produce alcohol. This is only possible if the pizza was not cooked correctly — and even then the levels of alcohol would be so low and not detected. That said, forms of fermentation can occur in other foods, especially when the use of yeast is involved. Again with the correct policy and procedures in place any risk with an incorrect reading is mitigated.

## 5. Some Vinegars Like Wine Vinegars Can Also Contain Low Levels Of Alcohol

Fruit can ferment; some dates when over-ripe reach 4.5% alcohol — but this is unusual and rarely seen.

Consideration of the chemistry and resulting physiology involved will show that, even if the fermentation process was able to proceed inside the body in the first place, the amount of sugar that would need to be converted in order to create an alcohol level of clinical or forensic significance is so large as to be inconceivable.

There would also be a huge amount of carbon dioxide gas generated as a by-product of the fermentation reaction process. Again inconceivable.

Consumption of various foods (including some pizzas) which, when their gas is regurgitated via a burp or during reflux can give a low alcohol reading at an initial blow and then zero immediately after. This is due to small levels of food fermentation or reflux in the stomach creating low level alcohol gases. There have been studies on the effects of gastro-esophageal reflux on alcohol testing. In these, the authors concluded that reflux is not a factor to be considered when the subject is post-absorptive and only occurs when alcohol is present in the stomach at very high concentrations.

Booker J.L., et al J. Forensic Sci. 60(6) 1516-1522 (2015)

## CONFECTIONERY

Some forms, like cough drops (often containing menthol) can cause false positives. So can some mints, chewing gums, energy drinks, protein bars and, obviously, liqueur chocolates. Correct policy and procedures place will mitigate the risk of incorrect readings.

## CIGARETTES

Surprisingly, these can provide a false positive despite the fact that the fuel sensor is dedicated to detecting ethanol. That is because the hydrogen present accounts for 1% of the composition of cigarette smoke.

Hydrogen can be oxidized at a platinum electrode to generate a current. This current is small but it is still recommended that there should be a 15 minute gap after smoking before taking an alcohol measurement.



## The Subject's Work or Environment

Many people work with and around volatile substances that can influence BAC readings. Typical examples include cleaning fluids, glues, contact adhesives, paint and removers, lacquers, auto-finishing and other spray paints. These can sometimes influence BAC readings and a 15 minute withholding period should be utilised if a positive reading occurs.



## CONCLUSION

Many of the instances cited above come up as optimistic excuses offered by subjects who have provided high BAC readings. Although such proffered causes need to be taken seriously because of legal and reputation-related reasons, many are simply instances of 'trying it on'.

A key part of the solution is to use BAC detection devices that meet all current criteria for accuracy and reliability — such as those provided by Alcolizer Technology, the Wall Mount4 auto calibrates every 24 hours using an internal NATA certified internal gas reference.

Notwithstanding this state-of-the-art technology, Alcolizer is well aware any BAC testing program depends upon the training and skills of the person conducting it. For this reason Alcolizer strongly recommends that all companies which plan to undertake a BAC testing program select the best quality equipment available and ensure that all staff engaged in conducting tests receive professional training.



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## ABOUT ALCOLIZER TECHNOLOGY

Alcolizer Technology is a world-leader in Alcohol and Other Drugs (AOD) testing and is recognized as one of Australia's most innovative and forward-thinking companies.

Headquartered in Perth, Australia, with offices around Australia they have been one of the world's leading manufacturers of alcohol breath testing equipment for almost 25 years; law enforcement agencies, industry and personal users trust Alcolizer to keep themselves and their employees safe.

Alcolizer is the largest provider of breath testing devices to Australian police and is the largest provider to the Australian Resource sector. Their products are built in Australia, for Australia, but shipped around the world wherever people value quality, reliability and innovation. With tailored education programs to help our customers meet the challenges of AOD program deployment and our factory certified technical support, when, and where, you need it. Alcolizer leading-edge products and services ensure you are working with a world leader in this essential field.

## ABOUT THE AUTHOR

Murdo Black is a senior R&D Director who has initiated, led projects and launched products in Medical Diagnostics for MediSense and Hypoguard he was Head of R&D at Axis-Shield and until recently CTO at Oxtox. During this time he has experienced a range of different cultures from a start-up company to a company needing a change in direction to a highly conservative established company. Commercially astute, he has discovered, licensed in and out technologies.

Murdo has a MBA from the University of Warwick, PhD University of Strathclyde, Toxicology, MSc University of Strathclyde, Instrumental Analysis and BSc Biochemistry (HONS) and now working with Alcolizer in the development of ground breaking drug testing solutions.