Please blow

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This is a weighing system to determine the mass flows of ethanol and water. Credit: PTB

The 'synthetic breath' which helps to thoroughly test each newly developed evidential breath analyser in approval procedures at the Physikalisch-Technische Bundesanstalt, Germany, can now be produced even more precisely. The newly developed generator can also be used to produce gas mixtures with other components, for instance, acetone or carbon dioxide, to calibrate appropriate sensors.

Christmas time is the time for mulled wine. And that tastes best at a Christmas market. So that market goers get home safely, the police are

increasing their drink driving checks on car drivers right now. Those who are asked to blow into the device in this type of traffic check can be sure that the value the device displays after a short time is correct. This is because the "synthetic breath" - which helps to thoroughly test each newly developed evidential breath analyser in approval procedures at the Physikalisch-Technische Bundesanstalt (PTB) - can now be produced even more precisely. The newly developed generator can also be used to produce gas mixtures with other components, for instance, acetone or carbon dioxide, to calibrate appropriate sensors.

Since 1998, evidential breath analyzers have been permitted for use in alcohol tests carried out by the police in road traffic. In Germany, they are an essential part of legal metrology and require a type approval from PTB before being used. For these tests, calibration gas mixtures are produced in PTB, which simulate the breath of a person who is under the influence of alcohol. The gas mixtures consist of air, water and ethanol in a precisely known composition and – to date – had been produced by the usual international saturation method. Here, an air stream is passed through an ethanol-water solution and enriched with ethanol and water until it is saturated. The concentration of ethanol in the gas stream is calculated via distribution coefficients which were determined empirically. In the literature, however, various values are to be found for them.

With the new generator developed at PTB, the gas mixtures can be produced in a dynamic-gravimetric way. The core of the generator is a weighing system with which the mass flows of ethanol and water are determined by the quasi-continuous weighing of the storage containers. The air is dosed via thermal mass flow controllers. The liquid components ethanol and water are injected into the carrier gas flow made of synthetic air and vaporize there completely. As the mass flows of the components are determined individually before mixing, the composition of the gas mixture can be traced directly back to the SI base

unit of mass, the kilogram. The use of empirical values from the literature is, thus, no long necessary.

The measurement uncertainty of the ethanol concentration in the gas mixture of the new generator was clearly reduced in comparison to the saturation method.

In the future, the generator can also be used to produce gas mixtures with other components e.g. acetone or carbon dioxide, to calibrate other types of sensors.

More information: Pratzler, S.: Dynamisch-gravimetrische Herstellung von Kalibriergasgemischen am Beispiel der Atemalkohol-Kalibriergase, Dissertation, ICTV Schriftenreihe Band 9, Cuvillier Verlag Göttingen 2010, ISBN: 978-3-86955-531-7

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