

Measuring Alcohol in Blood and Breath for Forensic Purposes — A Historical Review

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ABSTRACT: This review concerns important events and trends in the evolution of chemical tests for alcohol intoxication on two continents; Europe and North America. In particular, the pioneer workers in this field and their major contributions to forensic alcohol analysis are emphasized. Quantitative methods for the determination of alcohol in blood, breath, and urine appeared early in the twentieth century and experimental alcohol research had already started in several European countries. The first statutory limits of blood-alcohol concentration (BAC) were introduced in Norway and Sweden during the 1930–1940s where Widmark’s micro-diffusion method was approved for forensic purposes. Between 1931–1935 in the U.S., the first instrument (the Drunkometer) was developed for measuring the concentration of alcohol in a person’s breath to supplement various clinical signs and symptoms of drunkenness. The breath-alcohol concentration (BrAC) was always translated into the presumed coexisting BAC to furnish corroborative or presumptive evidence of impairment at the wheel. After the Breathalyzer device was developed by Borkenstein around 1953–54, breath-alcohol testing became firmly established for law enforcement purposes in the U.S. and Canada. The classic wet-chemistry methods of blood-alcohol analysis were displaced by enzymatic procedures in the early 1950s and in the 1960s gas chromatographic (GC) methods dominated. Today, headspace GC is the mainstay in forensic science laboratories for the determination of alcohol and other volatile substances in body fluids. The first breath-alcohol devices used in Europe were relatively simple screening tests for alcohol at the roadside and positive results were always followed-up by quantitative analysis of alcohol in blood or urine. The technology of breath-alcohol testing has changed dramatically over the years from chemical oxidation and colorimetric procedures towards physicochemical techniques such as gas chromatography, electrochemical oxidation, and multiple wavelength infrared spectrophotometry. In the early 1980s evidential breath-alcohol instruments were approved for law enforcement purposes in many European countries and threshold limits of BrAC were introduced alongside the existing statutory BAC limits.

KEY WORDS: Accidents, alcohol, analysis, blood, breath, breath-testing, drunkenness, DUI, driving, gas chromatography, history, intoxication, traffic safety.
