Analysenmethode aus dem Arbeitskreis Klinische Toxikologie

Rapid Determination of Cyanides in Biological Material by HS-GC/MS

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Cyanide photometric determination following the classical microdiffusion method in body fluids is rather time consuming [1]. More recently other methods have become available by Odoul et al. [2] using HS-GC/ECD and by Marquet et al. [3] using HS-GC/MS-cyanide identification in an azide suicide case. Both methods did not meet our required quantitative forensic criteria. So a more specific HS-GC/MS method with a capillary column HP-624 of 30 was developed. The column temperature is programmed from 60°C (2-min hold) to 120°C (7-min hold) at 50°C/min. Total GC-run time is 10 min. The sample volume used in the photometric method could be reduced from 2 ml to 1 ml.

HCN is liberated during an incubation step for 60 min at 60 °C by concentrated phosphoric acid from the matrix in a headspace vial and subsequently transformed to cyanogen chloride Cl-CN by reaction with chloramine T. The ions m/e = 61 and 63 for Cl-CN are monitored by SIM/MS and 1-BuOH is used as internal standard (m/e = 56, 31 and 41).

Moreover full MS-scan is also possible, if higher amounts of HCN are present. Thus not only a more rapid, but also a more specific method is now available.

The LOD is = 0,1 mg CN^-/L and the calibration curve is linear from 0,4 to 4 mg CN^-/L. The method can be also applied to other biological tissues and may be useful for a routine clinical and/or forensic toxicology laboratory in case of acute cyanide poisoning.

References

[1] Baselt RC, Analytical Procedures for Therapeutic Drug Monitoring and Emergency Toxicology, Biomedical Publications, 1980.

[2] Odoul M, Fouillet B, Nouri B, Chambon R, Chambon P, Specific Determination of Cyanide in Blood by Headspace Gas Chromatography, J.Anal.Toxicol., 18: 205-207 (1994).

[3] Marquet P, Clement S, Lotfi H, Dreyfuss MF, Debord J, Dumont D, Lachâtre G, Analytcial findings in a suicide involving sodium azide, J.Anal.Toxicol., 20: 134-138 (1996)