DETERMINATION OF ALCOHOL IN POSTMORTEM BLOOD SAMPLES USING AUTOMATED HEADSPACE GAS CHROMATOGRAPHY – MASS SPECTROMETRY

SARAVANAKUMAR MANIAM

FACULTY OF SCIENCE
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Name of Degree: **MASTER OF SCIENCE (ANALYTICAL CHEMISTRY & INSTRUMENTAL ANALYSIS)**

Title of Project Paper ("this Work"):

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ABSTACT

Determination of ethanol in post mortem blood has become one of the important tool in medico legal investigation. The concentration of the ethanol upon dead in a person or alive has legal complication if it is more than permitted level. In Malaysia the level of Blood Alcohol Concentration (BAC) permittable according Road Traffic Act 1987 is 0.08g/100ml of blood. Nonetheless the determination of ethanol concentration in fresh blood obtained from alcohol consumer post no significant problem whereas when the blood is obtained from dead person or post-mortem blood it validity is in questioned. Accurate interpretation of blood ethanol concentration at the time of death is a difficult task to obtain due to time and other environmental factor. A reliable and rapid method is required to overcome the difficultness of the analysis. Gas Chromatography Mass Spectrometry assisted with Headspace sampling has given a new way for accurate and rapid analysis with simple procedure. Validation on the method of determination concentration of ethanol in post-mortem blood using iso-propanol as the internal standard was conducted. The validation parameter obtained indicate that iso-propanol is suitable to be used as internal standard. The validated protocol was followed to analysis 50 post-mortem blood sample obtain from Forensic Medicine Department upon autopsy. Result obtained relates that the quantification of ethanol in post-mortem blood can be conducted with high accuracy and specificity.

Abstrak

Pengukuran kepekatan etanol dalam darah yang diperolehi semasa bedah siasat telah menjadi salah faktor penting dalam penyiasatan pegawai polis. Kepekatan etanol dalam darah pada seseorang yang hidup atau mati mempunyai komplikasi undang-undang jika ia adalah lebih daripada paras yang dibenarkan atau ditetapkan. Di Malaysia tahap kandungan alcohol dalam darah yang ditetapkan dalam Akta 'Road Traffic Act' 1987 adalah 0.08g/100ml. Penentuan kepekatan etanol dalam darah seorang yang hidup adalah tidak sukar atau kurang dipertikaikan namun kepekatan alcohol dalam darah yang diperolehi daripada seseorang yang telah mati menghadapi sedikit kesukaran dalam menentukan kesahihan kepekatan etanol yang diperolehi. Ia juga sering dipersoalkan atas factor-faktor luaran yang mana kandungan etanol darah boleh disebabkan oleh mekanisma pencernaan glukosa kepada ethanol. Oleh yang demikian tafsiran yang tepat amatlah diperlukan untuk menentukan kepekatan etanol darah pada masa kematian adalah kepekatan yang sebenarnya dan ini merupakan satu tugas yang sukar. Sehubungan dengan itu satu kaedah yang boleh dipercayai dan pantas diperlukan untuk mengatasi kesukaran dalam penganalisaan ini. Teknik yang dimaksudkan ialah "Gas Chromatography Mass Spectrometry" dibantu dengan persampelan 'headspace' telah memberikan nafas baru untuk analisis yang tepat dan cepat dengan prosedur yang mudah. Validasi kepada kaedah penentuan kepekatan etanol dalam darah bedah siasat menggunakan iso-propanol sebagai piawai dalaman telah dijalankan. Parameter validasi yang diperolehi menunjukkan bahawa iso propanol sesuai untuk digunakan sebagai piawai dalaman. Protokol disahkan dan digunakan untuk analisis 50

sampel darah (bedah siasat) yang diambil semasa pemeriksaan bedah siasat di Jabatan Perubatan Forensik Hospital Sungai Buloh. Keputusan yang diperolehi menunjukkan bahawa teknik dan instrumentasi yang digunakan adalah tepat dan sahih.