UNIVERSITY OF AMSTERDAM

FORENSIC LITERATURE THESIS

LITERATURE THESIS

Title	: *Chemical attribution and profiling of chemical warfare agents*
Keywords	: CBRN, chemical attribution signatures, forensic intelligence
Forensic Expertise Area	: Forensic Chemistry, Analytical Chemistry
Department	: CBRN protection
Institute/Company	: TNO
Supervisor	: Mirjam de Bruin-Hoegée/ Daan Noort
Email address	: mirjam.debruin@tno.nl
Telephone number	: 06-11682158
UVA Co-assessor	: Arian van Asten
UVA Coordinator	: Arian van Asten/Yorike Hartman

SHORT DESCRIPTION

The continuing threats of military conflicts and terrorism may involve the misuse of chemical weapons. Despite the effort of the Organisation for the Prohibition of Chemical Weapons (OPCW), chemical weapons are regularly used, e.g. in the Syrian Arab Republic [1]. In addition to establishing the nature of the agent used, addressing the question of its origin is of equal if not greater importance to accurately reconstruct events and find the persons and institutions responsible.

Multi-analytical profiling strategies are required to use profiling of chemical warfare agents for forensic intelligence purposes. Valuable tactical information includes information on production, the route of synthesis and raw materials [2–6]. This information will assist national defence, law enforcement and the OPCW in solving crimes or preventing additional attacks with chemical weapons. The aim of the literature thesis is to explore various chemical attribution and profiling strategies for chemical warfare agents.

REFERENCES

[1] United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic, Final report, 2013.

[2] G.M. Mong, C.G. Fraga, H.A. Colburn, G.A. Pérez Acosta, M.D. Crenshaw, K. Wallace, Impurity Profiling to Match a Nerve Agent to Its Precursor Source for Chemical Forensics Applications, Anal. Chem. 83 (2011) 9564–9572. https://doi.org/10.1021/ac202340u.

[3] C.G. Fraga, K. Bronk, B.P. Dockendor, A. Heredia-langner, Organic Chemical Attribution Signatures for the Sourcing of a Mustard Agent and Its Starting Materials, Anal. Chem. 88 (2016) 5406–5413. https://doi.org/10.1021/acs.analchem.6b00766.

[4] K. Höjer Holmgren, C.A. Valdez, R. Magnusson, A.K. Vu, S. Lindberg, A.M. Williams, A. Alcaraz, C. Åstot, S. Hok, R. Norlin, Part 1 : Tracing Russian VX to its synthetic routes by multivariate statistics of chemical attribution signatures, Talanta. 186 (2018) 586–596. https://doi.org/10.1016/j.talanta.2018.02.104.

[5] N.S. Mirjankar, C.G. Fraga, A.J. Carman, J.J. Moran, Source Attribution of Cyanides Using Anionic Impurity Pro fi ling, Stable Isotope Ratios, Trace Elemental Analysis and Chemometrics, (2016). https://doi.org/10.1021/acs.analchem.5b04126.
[6] J.J. Moran, C.G. Fraga, M.K. Nims, Stable-carbon isotope ratios for sourcing the nerve-agent precursor methylphosphonic dichloride and its products, Talanta. 186 (2018) 678–683. https://doi.org/10.1016/j.talanta.2018.04.021.

REQUIRED/RECOMMENDED EXPERTISE

- Basic understanding in forensic chemistry. Affinity with organic chemistry and analytical chemistry is recommended