LITERATURE THESIS

Title:	**Adulterants, cutting-agents and impurities in cocaine as potential candidates for retrospective data mining**
Keywords:	illicit drugs, adulterants, GC-MS, drug signature, chemical profile, data mining
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SHORT DESCRIPTION

Cocaine is the second most used illicit-drug in both The Netherlands and the EU with an estimated illicit-drug market of 9.1 billion euro in the EU in 2017. The Netherlands is reported as one of the entry points and distribution hubs of cocaine in the EU.[1] Cocaine production, trafficking and trade is thus a severe problem, both locally and worldwide. Throughout the illegal production chain, pure cocaine is cut and adulterated with various compounds, mainly to increase volume (and thus economic profit).[2,3] Also impurities resulting from the cultivation- and production processes may be present and could say something about the origin of the cocaine.[4,5]

Information about both the presence of cutting-agents and impurities in the end-product can provide valuable tactical forensic information about batch origin and comparison.[6] An overview of trends in cutting-agents over time could also provide valuable information about the uniqueness of certain cutting profiles and provides additional insight in the cocaine processing. When a cutting-agent and impurity profile is unique, it could be used as a marker to compare with other seizures. In this way, retrospective analysis of already present GC-MS data from forensic laboratories can give valuable additional insights about the drug materials based on information that is now often neglected. This approach was already successfully demonstrated for synthetic drugs.[7,8]

Goal of this literature thesis is to create an overview of the most important cutting-agents, adulterants and impurities in cocaine, their popularity and occurrence, and regional and historic differences. Important parameters to assess are those describing their usability for a retrospective data-mining approach on GC-MS data, such as concentration in end-product, selectivity for a certain origin or manufacturing process, and detectability in a general GC-MS screening after direct organic extraction. Other useful information includes molecular mass and GC-MS mass spectrum.

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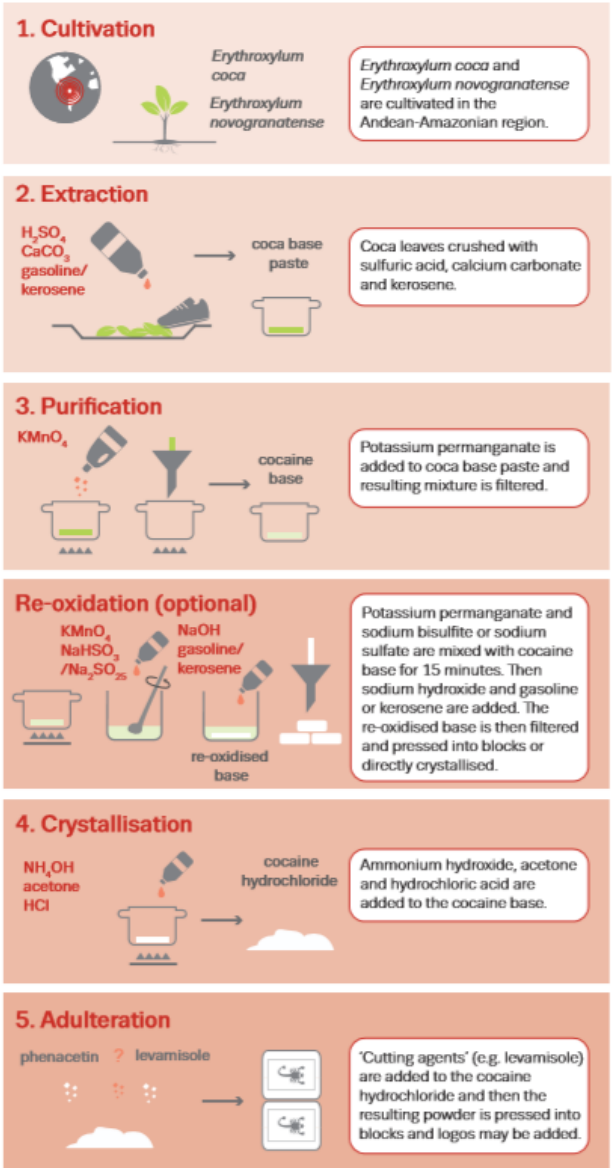
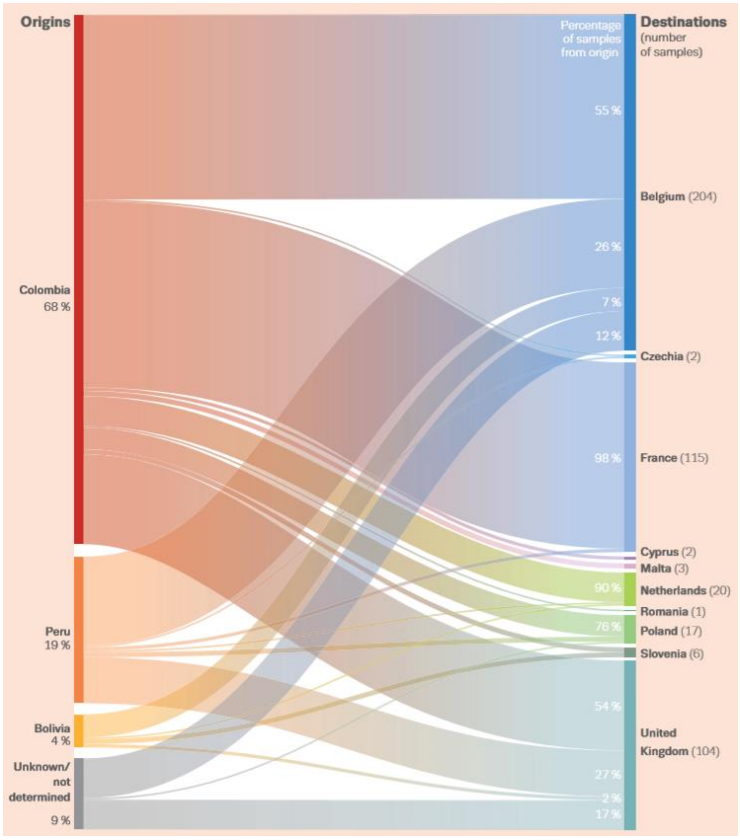
REQUIRED / RECOMMENDED EXPERTISE

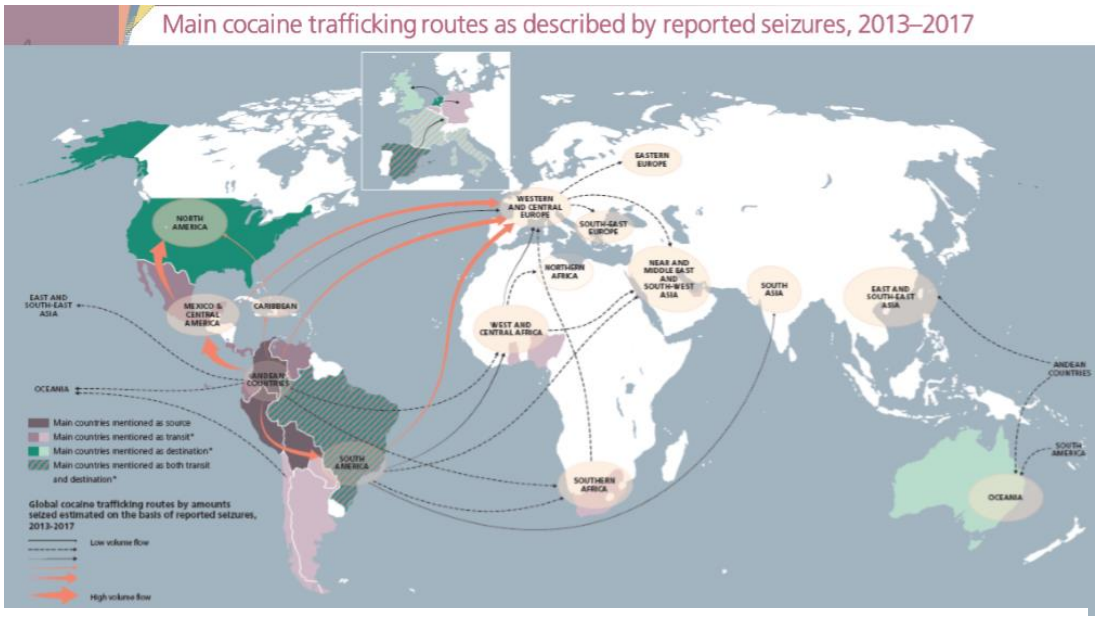
Basic understanding in forensic chemistry. Affinity with illicit drugs analysis is recommended.



The cocaine production process. Source: EMCDDA 2019[1]



Cocaine sample origin and seizure analysis. Source: EMCDDA 2019[1]



Source: United Nations Office on Drugs and Crime (UNODC), World Drug Report 2019