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SHIMADZU
Excellence in Science

VENDOR SEMINAR:

In Food We Trust - Let's Talk Quality

Ancient beverages and analytical chemistry

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The discovery of alcoholic beverages correlates with the period when mankind started to settle down in the Mesolithic around 10.000 BC. This happened incidentally by the spontaneous fermentation of overripe fruits. Since then alcohol is consumed around the globe. The Code of Hammurabi a Babylonian code of law dated back to 1754 BC also contains the first regulations about beer quality.

Since then several laws and regulations for alcoholic beverages were passed over the centuries. Nevertheless, it took until 1820 when the German Friedrich Accum published the first book on food chemistry and analysis entitled "Treatise on Adulteration of Food". Just six decades ago chromatographic methods found their way into analytical laboratories, changing the quality evaluation of food and beverages.

The history and quality of alcoholic beverages under the perspective of analytical chemistry will be discussed in this vendor seminar.

1) Early Neolithic wine of Georgia in the South Caucasus; https://doi.org/10.1073/pnas.1714728114
2) Revealing invisible brews: A new approach to the chemical identification of ancient beer https://doi.org/10.1016/j.jas.2018.05.010
3) Friedrich Accum, Treatise on Adulteration of Food, London 1820

SFC-MS: A viable alternative to LC-MS in food safety analysis

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Chromatographers have for decades been interested in the technique of supercritical fluid chromatography (SFC) primarily due to the rapid separations and complementary chromatographic selectivity that this technique offers as well as its high "green credentials" compared to LC. Progress in embedding SFC into routine use has been retarded by the lack of reliable SFC instrumentation. However, instrument manufacturers have recently started to invest in the development of equipment that is advanced and reliable enough to meet the demanding expectations of routine analytical laboratories. SFC instrumentation in terms of ease of use and performing method development is similar to (U)HPLC equipment, reducing the barrier for user acceptance. The inherent properties of SFC, high speed of analysis (fast mass transfer), alternate selectivity compared to LC-MS and significant cost savings on solvent disposal relative to HPLC, enables separation scientists to consider alternative approaches in achieving robust, reliable target compound detection. The elution power of SFC can be adjusted by the addition of a polar co-solvent, creating a pathway for relatively simple method development. Post-column addition of a make-up solvent can be used to further optimize ionization efficiency, therefore MS sensitivity, without dilution effect or degradation of chromatographic performance. The approaches used in optimizing SFC-MS for detecting a panel of pesticides in routine food safety testing will be

discussed, highlighting the need to consider ion source dynamics, column selection and the influence of mobile phase composition on selectivity and sensitivity. The optimized SFC-MS results are compared to an optimized LC-MS assay used in routine testing. SFC-MS was found to often deliver higher sensitivity compared to LC-MS, reduced matrix effects in a range of food products and greater selectivity for the analysis of a highly polar panel of pesticides.