



## Determination of cadmium and other elemental contaminants in cocoa/chocolate products and their packaging by ICP-MS

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**(O-55)****DETERMINATION OF CADMIUM AND OTHER ELEMENTAL CONTAMINANTS IN COCOA/CHOCOLATE PRODUCTS AND THEIR PACKAGING BY ICP-MS**Lucas Givelet, Heidi Amlund, Yuka Omura Lund, Katrin Löschner, and Jens J. Sloth*Research group for analytical food chemistry, National Food Institute, Technical University of Denmark, 2800 Lyngby, Denmark*

Cadmium (Cd) is a trace metal without essential biological functions that is toxic to plants, animals and humans. Due to an increasing concern regarding safe levels of Cd in cocoa, the European Union (EU) laid down maximum levels (ML) for Cd in different cocoa products categories from a legislation formulated in 2014 and taken into force in 2019 (EC Regulation No 1881/2006 and amendments).

Various cocoa/chocolate products (n=61) from the EU market, corresponding to the four categories (cocoa powder, chocolate with < 30% of dry cocoa solids, chocolate with 30% < > 50% of dry cocoa solids and chocolate with ≥ 50% dry cocoa solids) defined by the European Commission were analysed by ICP-MS for their content of 14 elements : As, Al, Ba, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sr and Zn. A correlation between the measured elements and the cocoa origin was made in order to assess the level/element, which were linked to a specified geographical origin. Moreover, the different cocoa/chocolate packaging (e.g. cardboard, aluminium foil, and white plastic) were analysed to assess a potential contamination to the food product from the packaging material. Certified materials: SRM 2384 Baking chocolate, ERM BD512 (Dark chocolate), ERM EC680m and ERM EC681m (low density polyethylene) were used to confirm the quality of the analysis.

The results of this work showed that approx. 10 % of the samples were not compliant with the EU legislation. Most of them were cocoa powders (ML = 0.60 mg/kg wet weight) and the results illustrated that cocoa from South and Central America contained higher levels of Cd than samples originating from Africa. The results highlighted that the levels of most of the elements were linked to the cocoa content in the product. Regarding the packaging, the results showed that aluminium was the main element for most of them following by iron (except for plastic packaging). A relatively high concentration of Ti (817 and 993 mg/kg) was detected in white plastic and may be due to the use of titanium dioxide as a white pigment. No correlation between the elemental concentrations in the cocoa/chocolate samples and the concentrations in the packaging was identified.