

Evaluation of disinfectant biocide residues accumulation on agri-food surfaces (ERSIA project)

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In food industry, biocides products (e.g. quaternary ammoniums, amines) are used for cleaning and disinfection (CD) of food contact surfaces to control microbiological contamination. Disinfectant biocides may leave residues on industrial equipment especially when procedures (e.g. contact time, rinsing) are not properly applied or may be also persist in critical areas that are difficult to access. The risk is that they can be a source of chemical contamination through transfer in foodstuffs. Therefore, a good knowledge of critical areas likely to retain biocide residues is essential to optimize the effectiveness of CD procedures, and thereby control the chemical and microbiological safety of the food products.

In this context, the main objectives of this project are to identify area or equipment where there is a risk of biocides accumulation in agri-food industries, based on residues surface sampling, and to suggest, if necessary, improvements to cleaning and disinfection procedures.

Within three partner industries, surface sampling were taken to quantify Didecyldimethylammonium chloride (DDAC) and N-(3-Aminopropyl)-N-dodecylpropane-1,3-diamine (AMPD) in areas previously identified as being at risk of biocide retention. For this study, 180 surface sampling were carried out over 3 days and spread over 2 separate periods (before cleaning and after disinfection). Considering the physicochemical properties of the compounds, two independent LC-MS/MS analysis were performed for the quantification of DDAC and AMPD on surfaces with limit of quantification of 2 ng/cm².

The study revealed a significant number of areas where DDAC and/or AMPD persist after the disinfection step, whereas they are less present before cleaning step. It should be noted that the results obtained are only an estimate of the presence of these substances following CD procedures, and that the project aimed to identify the areas most at risk from residues retention. To go further, it would be interesting to verify the hypothesis of a possible transfer to foodstuffs during production by the simultaneous analysis of surface samples and foodstuffs. The data obtained would also make it possible to carry out a dietary risk assessment for the consumer.

Keywords: biocide residues, industrial surfaces sampling, cleaning and disinfection procedures, LC-MS/MS analysis

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