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Spectroscopic and chemometric evaluation of Cling Films used for wrapping of foodstuff and illicit drugs

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Abstract

Thin films of various polymers are currently used for wrapping various food products and illicit drugs worldwide. In thin films, polyvinyl chloride is the third most widely used polymer after the polyethylene and polypropylene. These films usually contain harmful plasticizers such as adipates, phthalates, and citrates along with other additives. Plasticizers adversely affect the human health and therefore, their migration in foodstuff must be monitored carefully. By considering all these facts, this study summarizes the utilities of non-destructive ATR-FTIR spectroscopy in the identification of base polymer as well as plasticizers in various cling films and application of multivariate analysis in the identification and classification of the cling films to their respective groups. In the present research, a considerable transfer of plasticizers from the wrapping material is observed. A spectral library is developed for all 22 cling film samples for further comparison of the unknown sample. The obtained results are promising, especially for classification purposes. The multivariate method significantly provides 100 % of cross-validation classification along with 99.13 % discrimination. In this study, we have developed a method to compare or link a cling film which somebody uses and found that there is a transfer of plasticizers and other additives into the food and if the manufacturing company disown that this specific cling film does not belong to our company. In such type of cases, this method could link the suspected cling film to their manufacturers with precision and accurateness. The chronic effect of plasticizers on human health can also be linked to the type of cling film the accused was using consistently.

Keywords: Cling films, Plasticizers, ATR-FTIR, Multivariate Analysis, Classification; Chemometrics.

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