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A Novel LC/MS/MS Method with Dual Ion Source for Analysis of 102 Pesticides and 5 Mycotoxins in Hemp

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Abstract: Among different states in USA, Colorado published most stringent regulations for monitoring of 102 pesticides residues with low action limits in hemp products. Normally pesticide analysis in hemp and other food matrices is done by both GC/MS/MS and LC/MS/MS since some nonpolar and chlorinated pesticides such as pentachloronitrobenzene, endosulfan, etridiazole, fenvalerate, iprodione, chlorfenapyr and others are difficult to ionize with electrospray source used in LC/MS/MS systems. We would demonstrate how we measured these compounds at low levels using LC/MS/MS with APCI source. The ionization mechanism of chlorinated pesticides such as pentachloronitrobenzene, chlorfenapyr, acequinocyl and others using LC/MS/MS system with APCI source would be presented. Hemp matrix is challenging and therefore it causes ion suppression and matrix interference for response of some of pesticides. We would demonstrate different approaches such as different ion source (ESI or APCI), different mode of ionization (positive or negative ion mode), LC and MS method optimization and addition of internal standards to mitigate these matrix interference and matrix effects from hemp matrix to achieve higher sensitivity to meet Colorado state action limits for 102 pesticides in hemp with selectivity and method accuracy in range of 70-120 %. For sample preparation, we used simple solvent extraction since it is more quicker, cheaper, greener and easier way to achieve high extraction recovery for pesticides in comparison to other time-consuming, difficult and expensive sample preparation techniques like solid phase extraction (SPE) and QuEChERS with dSPE(dispersive solid phase extraction) which show poor extraction efficiency for some of pesticides.