

THE EMERALD CONFERENCE

Produced by MJBizScience

February 27 - March 1, 2022
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Analysis of Cannabis Vaporizer Aerosols for 10 Metals; Collection Methods, Results and Implications for the Industry

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Abstract: Cannabis vaporizer cartridges have increased in popularity and availability, and there are concerns regarding exposure to heavy metal compounds from their use. The hardware components of the cartridge devices themselves have been implicated as a potential source of metals exposure, but it is not known if these metals migrate into the inhalable vapor. This study has two parts; the first is optimizing the sample collection, preparation, and analysis of the nonpolar cannabis aerosol mixtures and the second part analyzes the hardware components and aerosol mixtures of vaporizer cartridges for 10 different metals (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb and Sn) using ICP-MS. We investigate various model systems as well as 13 randomly purchased commercially-available cannabis cartridges to compare the elemental profiles. Results indicate Chromium, Copper, Nickel, and Lead migrate both into the cannabis oil and the inhaled vapor phase. Comparisons to FDA medical guidelines and other regulatory bodies are included for toxicological context. Non-cartridge heating methods of cannabis flower and concentrate were compared and results indicate the heating device hardware is a source of metals contamination. As safety and compliance testing regulations evolve, it will be important to update analytical methods as well as include more than the standard As, Cd, Hg, and Pb elements to the list of regulated metals.