

Trace metals analysis in electronic cigarettes formulations using atomic spectroscopy techniques

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Background and objective: Electronic cigarettes (ECs) are battery-powered devices that convert liquid into an aerosol (suspension of liquid or solid or both in the gaseous state) that can be inhaled. The amount of aerosol generated can be affected by many factors including device settings, puff volume and duration. Heavy metals pose high health risk ones administered to human body at high concentrations. As electronic cigarettes are used wildly these days therefore it is important to ensure that they do not contain high level of heavy metals in their formulations. The research goal of this study is to quantify the concentration of heavy metals in the liquid of E-cigarette using Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Methods: Five samples of E-liquids were purchased from the market in Saudi Arabia to quantify the level of heavy metals. Two methods were used to prepare E- liquids. First method was preparing E-liquids directly from its bottle while other method was placed E-liquids in E- cigarette's device for 20 puffs. In both methods weighed 0.2g into digestion vessel then 2 mL of deionized water and 5 mL of nitric acid were added before place digestion vessels into the microwave. All metals were quantified using Inductively coupled Plasma Mass Spectrometry (ICP-MS).

Results: The average concentration of five different samples were quantified for cadmium (Cd), lead (Pb), arsenic (As), mercury (Hg), Chromium (Cr), Tin (Sn) and Copper (Cu) in the first method were 0.963, 6.698, 11.845, 12.390, 0.000, 5.932 and 5.654 µg/l, respectively. On the other hand, the concentration in the second method for cadmium (Cd), lead (Pb), arsenic (As), mercury (Hg), Chromium (Cr), Tin (Sn) and Copper (Cu) were 0.114, 131.853, 12.184, 7.480, 154.042, 134.189 and 442.980 µg/l, respectively.

Conclusion: Our data suggest that e-cigarettes could be a source of harmful metal exposure (Pd, Cr, Sn and Cu) the tank samples had higher amounts, indicating that coil contact caused E-liquid contamination.

Biography

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