Comparison of EPA 1340 and CAB Method for Bioaccessible Lead and Arsenic in Soils

Brian Smith, Ariana Dionisio, Annie Carter
Brooks Applied Labs, 18804 North Creek Parkway, Suite 100, Bothell, WA 98011 USA

Introduction

Conservation from tissues, as a health hazard, is not the sole health hazard from exposure to complex mixtures of organics and metals. The California Arsenic Bioaccessibility (CAB) Method, as validated in 2018, is a new method designed to simulate human exposure to metals. The CAB Method allows the determination of bioaccessible As(V) and Pb for the purpose of assessing the leachable fraction and predicting human health risk. The CAB Method involves the use of Bioaccessibility Leach Fluid, a mixture of gastric, intestinal, and simulated human urine. This method is designed to be used in the context of risk assessment for soils and sediments. This method is based on the validation study performed to assess the CAB Method’s accuracy and precision for soils across all soil types and is the basis for the accuracy assessment of soils.

Results

Comparison of EPA 1340 and CAB Method for Bioaccessible Lead and Arsenic in Soils

EPA 1340

- Lead: 100 mL of solution to 1.0 g sample
- Carboxylic acid
- Heat solution at 37 ± 2 °C
- Cool to final volume of 2.0 L with DI H2O

CAB Method

- Lead: 100 mL of solution to 1.0 g sample
- Carboxylic acid
- Heat solution at 37 ± 2 °C
- Cool to final volume of 2.0 L with DI H2O

Discussion

The validated methods for lead and arsenic in soils are the EPA 1340 Method and the California Arsenic Bioaccessibility (CAB) Method. The CAB Method showed higher concentration of total lead in the bioaccessible fraction compared to EPA 1340. The results suggest that the CAB Method may be a more sensitive method for assessing the bioavailability of lead in soils. Further studies are needed to validate the CAB Method for assessing the bioavailability of arsenic in soils.

Conclusion

The validated methods for lead and arsenic in soils are the EPA 1340 Method and the California Arsenic Bioaccessibility (CAB) Method. The CAB Method showed higher concentration of total lead in the bioaccessible fraction compared to EPA 1340. The results suggest that the CAB Method may be a more sensitive method for assessing the bioavailability of lead in soils. Further studies are needed to validate the CAB Method for assessing the bioavailability of arsenic in soils.

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