Estimation of Pb and Cd in the whole blood by ICP-OES technique: A comparison of microwave digestion and simple dilution method

Hatem Ahmed and **Almohammed**
Naif Arab University for Security Sciences, Saudi Arabia

Abstract (300 word limit) Forensic investigations necessitate the quick identification and quantification of toxic substances to begin adequate treatment for trace metal toxicity. As a result, finding precise and time-effective digestive methods for identifying toxic substances in biological samples of a person suspected of poisoning is critical. In the present study, a comparison between the microwave digestion and simple dilution method of blood samples and their detection by induction coupled optical emission spectroscopy ICP-OES was carried out. Twenty-three human whole blood samples were collected from fully consented volunteers in EDTA-blood tubes. Whole blood samples were prepared using HNO3:H2O2 for microwave digestion and HNO3:H2O2, Triton X100, and N-butanol for the simple dilution method. Validation of the method was executed by determining accuracy and precision. Method sensitivity was assessed by determining limits of detection (LOD) and quantification (LOQ). Our results showed a significant difference in the recovery ratios in favor of lead (Pd) and cadmium (Cd) between simple dilution and microwave digestion techniques. This study indicated that microwave digestion may be a better choice than the simple dilution technique in terms of recovery and accuracy whereas simple dilution was both cost and time-effective for the isolation, identification, and quantification of toxic metals in cases of poisoning.

Recent Publications

1. Ahmed, H. A. M., Al Saad Mohammed Ali, M. N., & Janjua, M. A. H. H. (2019). Determination of Lead, Cadmium and, Mercury in Some Medicinal Plants and their User's Urine Samples. Eurasian Journal of Analytical Chemistry, 14(1), 157-164.
2. Ahmed, H. A. M. (2020). Biochemical and Haematological Parameters Among Gas Station Employees.
3. Ahmed, H. A. M., & Alsohaibani, G. H. (2020). Analysis of toxic heavy metals in liquid versus dried blood samples. International Journal of Environmental Analytical Chemistry, 1-8.
4. Ahmed, A. S., Aldubayan, M. A., Ahmed, H. A., Refaat, A. M., Alsalloumi, A. S., Almasuood, R. A., & Elgharabawy, R. M. (2021). Impact of smoking on heavy metal contamination and DNA fragmentation. Environmental Science and Pollution Research, 28(11), 13931-13941.
5. Almowalad, R. A., Emara, H., Ahmed, H., & Ibrahim, S. F. (2019). Assessment of blood pregabalin stability at different postmortem durations. The Saudi Journal of Forensic Medicine and Sciences, 2(2), 28.

Biography

Dr. Hatem Abdel Moneim Ahmed has field experience in the field of forensic sciences, with experience that spanned nearly 20 years, before joining the academic work as an associate professor at Naif Arab University for Security Sciences in 2012. He practiced writing reports on cases of poisoning, drug addiction, murder, suicide, and drug trafficking by working in the Forensic Medicine Authority - Egypt. He practiced fieldwork in raising antiquities at the crime scene resulting from some crimes. He taught drug and poisonous analysis for master's and higher diploma students and supervised a number of master's theses in the field of drug and toxicology analysis. He organized and participated in local and international courses, conferences, and workshops in the field of toxicology and drug analysis, and he has many refereed scientific research published in many reputable international journals

Received: January 12, 2022; **Accepted**: January 15, 2022; **Published**: March 09, 2022