Proceedings International
Open-Access Journal (ISSN: 2668-6384)

Proceedings, Abstract
Volume 6, Issue 1, 2024, 21
https://doi.org/10.33263/Proceedings61.021

Towards Safer Environment: The Role of Detection Techniques in Managing Carcinogenic Chromium Contamination †

Ayushi Chauhan [1], Vaibhav Mishra 1,*

[1] Department of Forensic Science, (UIAHS), Chandigarh University, Mohali, Punjab, India. chauhanayushi519@gmail.com (A.C.); vaibhavmishra674@gmail.com (V.M.);
* Correspondence: vaibhavmishra674@gmail.com (V.M.);
† Presented at 3rd National Conference on Environmental Toxicology: Impact on Human Health (Env-Tox 2024)
Received: 16.02.2024; Accepted: 20.03.2024; Published: 28.03.2024

Abstract: Pollution from toxic metals and metalloids is a major concern for the environment. Chromium, in particular, is significant due to its harmful effects, like cancer and genetic mutations. Trivalent chromium is less common because it doesn't dissolve easily, while hexavalent chromium, which dissolves well, is more prevalent in groundwater. Hexavalent chromium (Cr(VI)), a type commonly found in drinking water, is a major concern as it is linked to cancer. Chromium pollution mostly comes from natural processes where certain rocks interact with groundwater. However, human activities like mining, burning coal, and dumping industrial waste can increase chromium levels. This review looks at different methods for detecting carcinogenic chromium. Traditional techniques include color tests, spectroscopy, chromatography, electrochemistry, gravimetry, and mass spectrometry, while newer methods involve biosensors, nanomaterial-based sensors, molecularly imprinted polymers (MIPs), and microfluidic devices. Challenges like interference from other compounds, sensitivity issues, sample preparation, and equipment availability are mostly encountered during analysis. Recent improvements in sensor design, machine learning integration, miniaturization, and multi-parameter detection platforms have been incorporated, which can help monitor chromium contamination in water, soil, and air and ensure occupational health and regulatory compliance. Future perspectives include emerging trends, commercialization opportunities, research gaps, and the importance of interdisciplinary collaboration in advancing chromium detection technologies.

Keywords: hexavalent chromium; contamination; detection techniques; environmental monitoring; public health.

Funding

None.

Acknowledgments

None.

Conflicts of Interest

The authors declare no conflict of interest.