Risk Assessment

1-Update of the risk assessment of inorganic arsenic in food

By Schrenk, D (Schrenk, Dieter) ; Bignami, M (Bignami, Margherita) ; Bodin, L (Bodin, Laurent) ; Chipman, JK (Chipman, James Kevin) ; del Mazo, J (del Mazo, Jesus) ; Grasl-Kraupp, B (Grasl-Kraupp, Bettina) ; Hogstrand, C (Hogstrand, Christer) ; Hoogenboom, L (Hoogenboom, Laurentius (Ron)) ; Leblanc, JC (Leblanc, Jean-Charles) ; Nebbia, CS (Nebbia, Carlo Stefano) ; Group Author ESPA Panel Contaminants Food (ESPA Panel Contaminants Food) (provided by Clarivate) **Source EFSA JOURNAL Volume 22 Issue DOI 10.2903/j.efsa.2024.8488 Article Number e8488 Published JAN 2024 Indexed 2024-02-02 Document Type Article**

Abstract

The European Commission asked EFSA to update its 2009 risk assessment on arsenic in food carrying out a hazard assessment of inorganic arsenic (iAs) and using the revised exposure assessment issued by EFSA in 2021. Epidemiological studies show that the chronic intake of iAs via diet and/or drinking water is associated with increased risk of several adverse outcomes including cancers of the skin, bladder and lung. The CONTAM Panel used the benchmark dose lower confidence limit based on a benchmark response (BMR) of 5% (relative increase of the background incidence after adjustment for confounders, BMDL05) of 0.06 mu g iAs/kg bw per day obtained from a study on skin cancer as a Reference Point (RP). Inorganic As is a genotoxic carcinogen with additional epigenetic effects and the CONTAM Panel applied a margin of exposure (MOE) approach for the risk characterisation. In adults, the MOEs are low (range between 2 and 0.4 for mean consumers and between 0.9 and 0.2 at the 95th percentile exposure, respectively) and as such raise a health concern despite the uncertainties.

Keywords

Author Keywords

benchmark dose (BMD)epidemiological studiesinorganic arsenic (iAs)margin of exposure (MOE)risk assessment

Keywords Plus

NEURAL-TUBE DEFECTSCHILDRENS INTELLECTUAL FUNCTIONNUCLEOTIDE EXCISION-REPAIRGLUTATHIONE-S-TRANSFERASEAUTISM SPECTRUM DISORDERINDUCED SKIN-LESIONSPOSTTRANSLATIONAL HISTONE MODIFICATIONSVITRO TOXICOLOGICAL CHARACTERIZATIONGESTATIONAL DIABETES-MELLITUSTRANSITIONAL-CELL CARCINOMA

Risk Assessment

2-Comprehensive review on toxic heavy metals in the aquatic system: sources, identification, treatment strategies, and health risk assessment

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By Saravanan, P (Saravanan, Panchamoorthy) [1] ; Saravanan, V (Saravanan, V.) [2] ; Rajeshkannan, R (Rajeshkannan, R.) [2] ; Arnica, G (Arnica, G.) [1] ; Rajasimman, M (Rajasimman, M.) [2] ; Baskar, G (Baskar, Gurunathan) [3] , [4] ; Pugazhendhi, A (Pugazhendhi, Arivalagan) [5] , [6] (provided by Clarivate) **Source ENVIRONMENTAL RESEARCH Volume 258 DOI 10.1016/j.envres.2024.119440 Article Number 119440 Published OCT 1 2024 Early Access JUN 2024 Indexed 2024-11-11 Document Type Review**

Abstract

Heavy metal pollution in water sources has become a major worldwide environmental issue, posing a threat to aquatic ecosystems and human health. The pollution of the aquatic environment is increasing as a result of industrialization, climate change, and urban development. The sources of heavy metal pollution in water include mining waste, leachates from landfills, municipal and industrial wastewater, urban runoff, and natural events such as volcanism, weathering, and rock abrasion. Heavy metal ions are toxic and potentially carcinogenic. They can also buildup in biological systems and cause bioaccumulation even at low levels of exposure, heavy metals can cause harm to organs such as the nervous system, liver and lungs, kidneys and stomach, skin, and reproductive systems. There were various approaches tried to purify water and maintain water quality. The main purpose of this article was to investigate the occurrence and fate of the dangerous contaminants (Heavy metal and metalloids) found in domestic and industrial effluents. This effluent mixes with other water streams and is used for agricultural activities and other domestic activities further complicating the issue. It also discussed conventional and non-conventional treatment methods for heavy metals from aquatic environments. Conclusively, a pollution assessment of heavy metals and a human health risk assessment of heavy metals in water resources have been explained. In addition, there have been efforts to focus on heavy metal sequestration from industrial waste streams and to create a scientific framework for reducing heavy metal discharges into the aquatic environment.

Keywords

Author Keywords

Heavy metalWater resource contaminationToxicityHealth effectsRisk assessmentBioindicators and bioaccumulation

Keywords Plus

DRINKING-WATERINDUSTRIAL WASTEWATERSAQUEOUS-SOLUTIONSORGANIC-COMPOUNDSOXIDATIVE STRESSACTIVATED CARBONHIP-REPLACEMENTREMOVALNICKELEXPOSURE

Risk Assessment

3-Hydrogen Safety Challenges: A Comprehensive Review on Production, Storage, Transport, Utilization, and CFD-Based Consequence and Risk Assessment

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By Calabrese, M (Calabrese, Marcella) [1] , [2] ; Portarapillo, M (Portarapillo, Maria) [1] ; Di Nardo, A (Di Nardo, Alessandra) [1] ; Venezia, V (Venezia, Virginia) [1] , [3] ; Turco, M (Turco, Maria) [1] ; Luciani, G (Luciani, Giuseppina) [1] ; Di Benedetto, A (Di Benedetto, Almerinda) [1] (provided by Clarivate) **Source ENERGIES Volume 17 Issue 6 DOI 10.3390/en17061350 Article Number 1350 Published MAR 2024 Indexed 2024-04-08 Document Type Review**

Abstract

This review examines the central role of hydrogen, particularly green hydrogen from renewable sources, in the global search for energy solutions that are sustainable and safe by design. Using the hydrogen square, safety measures across the hydrogen value chain-production, storage, transport, and utilisation-are discussed, thereby highlighting the need for a balanced approach to ensure a sustainable and efficient hydrogen economy. The review also underlines the challenges in safety assessments, points to past incidents, and argues for a comprehensive risk assessment that uses empirical modelling, simulation-based computational fluid dynamics (CFDs) for hydrogen dispersion, and quantitative risk assessments. It also highlights the activities carried out by our research group SaRAH (Safety, Risk Analysis, and Hydrogen) relative to a more rigorous risk assessment of hydrogen-related systems through the use of a combined approach of CFD simulations and the appropriate risk assessment tools. Our research activities are currently focused on underground hydrogen storage and hydrogen transport as hythane.

Keywords
Author Keywords
hydrogen economysafety concernshydrogen regulationsCFD simulationsrisk assessment

Keywords Plus
NUMERICAL-SIMULATIONUNINTENDED RELEASESCLOUD EXPLOSIONTANK RUPTUREDISPERSIONDECAYMETHODOLOGYSTATISTICSPARAMETERSHAZARDS

Risk Assessment

4-Hydrogen Safety Challenges: A Comprehensive Review on Production, Storage, Transport, Utilization, and CFD-Based Consequence and Risk Assessment

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By Calabrese, M (Calabrese, Marcella) [1] , [2] ; Portarapillo, M (Portarapillo, Maria) [1] ; Di Nardo, A (Di Nardo, Alessandra) [1] ; Venezia, V (Venezia, Virginia) [1] , [3] ; Turco, M (Turco, Maria) [1] ; Luciani, G (Luciani, Giuseppina) [1] ; Di Benedetto, A (Di Benedetto, Almerinda) [1] **(provided by Clarivate) Source ENERGIES Volume 17 Issue 6 DOI 10.3390/en17061350 Article Number 1350 Published MAR 2024 Indexed 2024-04-08 Document Type Review Open Peer Reviews**

Abstract

This review examines the central role of hydrogen, particularly green hydrogen from renewable sources, in the global search for energy solutions that are sustainable and safe by design. Using the hydrogen square, safety measures across the hydrogen value chain-production, storage, transport, and utilisation-are discussed, thereby highlighting the need for a balanced approach to ensure a sustainable and efficient hydrogen economy. The review also underlines the challenges in safety assessments, points to past incidents, and argues for a comprehensive risk assessment that uses empirical modelling, simulation-based computational fluid dynamics (CFDs) for hydrogen dispersion, and quantitative risk assessments. It also highlights the activities carried out by our research group SaRAH (Safety, Risk Analysis, and Hydrogen) relative to a more rigorous risk assessment of hydrogen-related systems through the use of a combined approach of CFD simulations and the appropriate risk assessment tools. Our research activities are currently focused on underground hydrogen storage and hydrogen transport as hythane.

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Keywords Plus
NUMERICAL-SIMULATIONUNINTENDED RELEASESCLOUD EXPLOSIONTANK RUPTUREDISPERSIONDECAYMETHODOLOGYSTATISTICSPARAMETERSHAZARDS

Risk Assessment

5-Chemometric investigation of river system contamination: Source identification and risk assessment using positive matrix factorization and Monte Carlo simulation

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ByUstaoglu, F (Ustaoglu, Fikret) [1] ; Yüksel, B (Yuksel, Bayram) [2] ; Yazman, MM (Yazman, Mehmet Metin) [3] ; Jaskula, J (Jaskula, Joanna) [4] ; Tokatli, C (Tokatli, Cem) [5] (provided by Clarivate)
Source JOURNAL OF CONTAMINANT HYDROLOGY Volume 273 DOI 10.1016/j.jconhyd.2025.104627 Article Number 104627 Published JUL 2025 Early Access MAY 2025 Indexed 2025-06-08
Document Type Article

Abstract

This study investigates the water quality of the Abdal River System in T & uuml;rkiye, an important water supply for the metropolitan area, using chemometric applications, including Positive Matrix Factorization (PMF) for source apportionment and Monte Carlo Simulation (MCS) for health risk assessment. Surface water samples were analyzed for 14 potentially toxic elements (PTEs), including nutrients and other elements. Their concentrations, in ascending order, were: Cd (0.13) G Cr (1.34) G Pb (1.50) G Mn (1.89) G Hg (1.98) G Cu (2.96) G Ni (5.32) G As (7.17) G Fe (31.16) G Zn (151.48) G Al (320.86) GK (3631) G Mg (15607) G Na (18870) G Ca (72842) mu g/L. The water quality was evaluated utilizing indices including Heavy Metal Pollution Index (HPI), Water Quality Index (WQI), and Contamination Degree (CD), with results indicating generally good water quality and minimal pollution levels. PMF analysis identified three primary sources of contamination: natural/geogenic processes, agricultural runoff, and urban activities including domestic runoff. Health risk assessments highlighted arsenic as the most significant contributor to non-carcinogenic and carcinogenic risks. For children, the hazard index (HI) for arsenic was 7.35E-01 (ingestion: 7.26E-01; dermal: 9.00E-03), remaining below the safety threshold of 1, indicating no significant non-carcinogenic risk. Similarly, the carcinogenic risk (CR) for arsenic was 2.92E-04, within the acceptable range (1E-06 to 1E-04). The Monte Carlo Simulation quantified variability and uncertainty in health risks, highlighting arsenic as the main contributor, with 16.15 % of scenarios for children exceeded the acceptable non-carcinogenic risk threshold. This study is the first to integrate PMF with MCS for a comprehensive evaluation of pollution sources and health risks in the Abdal River System, offering a novel approach to environmental management in semi-urban watersheds. The findings confirm the water quality is safe under current conditions but highlight the need for ongoing monitoring and targeted mitigation to ensure sustainable management of the Abdal River System.

Keywords
Author Keywords
Water qualityHealth risk assessmentPositive matrix factorizationMonte Carlo simulationPotentially toxic elements

Keywords Plus
MULTIVARIATE STATISTICAL EVALUATIONDISSOLVED TRACE-ELEMENTSWATER-QUALITY ASSESSMENTSURFACE-WATERHEAVY-METALSPOLLUTIONGIRESUNGROUNDWATERREACHESSTREAM