CHEMWATCH

Bulletin Board

Contents

JAN. 23, 2026

(click on page numbers for links)

CHEMICAL EFFECTS

Fenitrothion: an up-to-date review of environmental occurrence, exposure, toxicity, and molecular mechanisms 3

Leaching behavior and toxicity of solid waste from ore-based lithium extraction: Implications for safe storage and resource utilization ... 5

ENVIRONMENTAL RESEARCH

Environmental impact of shipwrecks used as artificial reefs: a case study from Karaburun, İzmir, the Aegean Sea 6

Alterations in Cardiometabolic Markers Associated with Canada-Wide and Sector-Specific Multiple Air Pollutant Exposures 7

Machine learning frameworks for predicting pulmonary cell toxicities induced by metal ions in the atmosphere 7

PHARMACEUTICAL/TOXICOLOGY

Urban Soils Encounter More Severe Per- and Polyfluoroalkyl Substance Contaminations and Associated Exposure Risks..... 8

Toxicological characterization of flue gases from closed combustion of conventional solid fuels and co-burned plastic wastes 9

Novel approach to nitrate and macro-elements: carcino-spectrum of human health risk projections..... 10

OCCUPATIONAL

High serum PFAS levels in a population after exposure through drinking water in western Tokyo, Japan and their half-lives estimation 11

CONTACT US

subscribers@chemwatch.net
tel +61 3 9572 4700
fax +61 3 9572 4777

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

CHEMICAL EFFECTS

Fenitrothion: an up-to-date review of environmental occurrence, exposure, toxicity, and molecular mechanisms

2026-01-17

Fenitrothion (FNT) is a widely used organophosphorus pesticide with low toxicity to humans and animals. Due to its wide application in agriculture, the distribution and toxic effects of FNT have received increasing attention. This review comprehensively assesses environmental levels and human exposure to FNT. FNT can be absorbed into the human body through various routes, including ingestion, dermal contact, and inhalation. Humans are exposed primarily through their diet. It has been shown in previous studies that FNT has several toxic effects, such as neurotoxicity, endocrine disruption, hepatotoxicity, immunotoxicity, reproductive toxicity, and developmental toxicity. FNT also induces oxidative stress, apoptosis, and inflammatory responses, which are crucial mechanisms underlying its multiple toxicities. This review will help to fill the gaps in knowledge related to the exposure, toxicity, and toxicity mechanisms of FNT and provide a scientific and theoretical basis for the environmental management of FNT.

Authors: Yuchao Guo, Dandan Gu, Emmanuel Sunday Okeke, Weiwei Feng, Yao Chen, Guanghua Mao, Liuqing Yang, Ting Zhao, Xiangyang Wu

Full Source: Environmental geochemistry and health 2026 Jan 17;48(2):101. doi: 10.1007/s10653-025-02871-5.

Leaching behavior and toxicity of solid waste from ore-based lithium extraction: Implications for safe storage and resource utilization

2026-01-12

The rapid expansion of lithium-ion battery (LIB) production has led to a substantial increase in the generation of solid waste, which poses potential environmental risks. However, the environmental behavior and potential adverse effects of lithium (Li)-derived solid waste remain poorly understood. This study systematically compared leaching behavior and toxicity of Li ores, tailings, and slags from ore-based Li extraction industries. The results revealed distinct physicochemical properties across the materials, with slags exhibiting significantly higher levels of toxic elements. Notably, thallium (Tl) leaching from slags reached 13-14 μg/L (pH 3-8), exceeding drinking water standards by 6.5 to 7 times, while

CHEMWATCH
Bulletin Board
Technical
JAN. 23, 2026

beryllium (Be) release from tailings at pH 3 exceeded the safety limit by a factor of three. The leaching mechanisms differed substantially: ores and tailings exhibited strong pH dependence, whereas slag leaching was pH-independent for key elements across the pH range of 3 to 8. Toxicity assessments showed that slag leachate induced complete mortality in zebrafish embryos, while all leachates caused significant developmental abnormalities, including reduced heart rate and body length. These findings underscore the need for waste-specific management strategies, with slags requiring impermeable containment due to their persistent leaching properties and high toxicity potential, providing essential insights for the environmentally sound disposal of Li processing wastes.

Authors: Jiefeng Liang, Luqian Zheng, Qun Zhang, Jiawen Yang, Bo Lei, Feigang Yuan, Mingyang Li, Wei Jiang, Yiling Li, Xuezhi Yang, Runzeng Liu, Haiyan Zhang, Qin Liu, Guibin Jiang

Full Source: Water research 2026 Jan 12:292:125385. doi: 10.1016/j.watres.2026.125385.

ENVIRONMENTAL RESEARCH

Environmental impact of shipwrecks used as artificial reefs: a case study from Karaburun, İzmir, the Aegean Sea

2026-01-19

Artificial wrecks (AWs), which are intentionally submerged structures to promote marine biodiversity and support recreational diving, have gained increasing prominence on a global scale. Nevertheless, concerns regarding their environmental safety persist, especially in regions where regulatory oversight is limited. This study examines the ecological and human health risks posed by two artificial wrecks ("Alaybey" and "9 Eylül") deployed in the Karaburun Peninsula, Northeast Mediterranean, Türkiye, compared to a no-wreck site (Aslan Kayası). Despite rigorous pre-sinking protocols to remove fuels and oils, critical pollutants-such as antifouling paint residues containing Cu, Zn, Pb, and PCBs-persist due to incomplete cleaning. Over two years, seasonal sampling of sediments, mussels (Mytilus galloprovincialis), and fish (Diplodus vulgaris) revealed alarming trends. Sediments near AWs showed enrichment of Pb (EF: 37.2-92.1) and Cd (EF: 9.3-16.0) from significant to extremely high enrichment. The Potential Ecological Risk Index (PERI) reached > 1,000 at the "9 Eylül" wreck, classifying it as "extremely high risk." Mussels on AWs bioaccumulated Cd and Pb above EU safety thresholds, while fish on AWs exhibited Pb levels of 236-340 fold over limits. Notably, Hg contamination in fish samples obtained from the no-wreck site (1.2 mg kg-1) was traced to historic

mining activities, underscoring region-wide pollution. These findings challenge the assumption that "cleaned" AWs are environmentally benign and highlight systemic gaps in pollutant mitigation, particularly for toxic coatings. The study advocates for stringent pre-deployment protocols, including paint stripping and PCB screening, to align AWs projects with global sustainability goals.

Authors: Tuğçe Şensurat-Genç, Adnan Çağlar Oruç, Ebru Yeşim Özkan, Altan Lök, Aytaç Özgül, Serkan Kükrer

Full Source: Environmental monitoring and assessment 2026 Jan 19;198(2):144. doi: 10.1007/s10661-025-14969-5.

Alterations in Cardiometabolic Markers Associated with Canada-Wide and Sector-Specific Multiple Air Pollutant Exposures

2026-01-14

Existing evidence on air pollution exposure and cardiometabolic biomarker associations does not consider pollution mixtures and sector-specific pollution contributions. Participants from the cross-sectional Canadian Health Measures Survey (2007-2019) were included. Annual average concentrations of ambient PM2.5, SO2, NO2, and O3 (2006-2019) were modeled using the Global Environmental Multi-scale - Modelling Air quality and Chemistry (GEM-MACH) chemical transport model at a 10 km by 10 km surface resolution from all sources combined as well as from eight specific sectors. The quantile g-computation model was used to estimate changes in lipid and glucose metabolic markers associated with interquartile increases in air pollution. A total of 30,781 participants aged 3 to 79 years were included in the study. Exposure to PM2.5, O3, NO2, and SO2 from all sectors was associated with increases in the ratio of total cholesterol to HDL (0.039, 95% CI: 0.017,0.060), apolipoprotein B (0.011, 95% CI: 0.006,0.017), fasting glucose (0.076, 95% CI: 0.010,0.142), and insulin (3.159, 95% CI: 1.180,5.138), as well as decreases in the cardioprotective lipids, HDL (-0.015, 95% CI: -0.023,-0.008) and apolipoprotein A1 (-0.010, 95% CI: -0.020,-0.000). Lipid and apolipoprotein levels as well as markers of insulin resistance were predominantly altered in children and younger adults, although there was no significant effect modification by age. On- and off-road transportation sectors were most frequently associated with adverse lipid biomarker effects. The joint effects of mean annual PM2.5, O3, NO2, and SO2 exposures were associated with worsening cardiometabolic markers. Further research is required to better

CHEMWATCH
Bulletin Board
Technical
JAN. 23, 2026

understand the mechanisms by which specific air pollution components disrupt metabolic pathways.

Authors: Jessica Evans, Robert Dales, Kimberly Mitchell, Sabit Cakmak

Full Source: Environmental pollution (Barking, Essex: 1987) 2026 Jan 14:127671. doi: 10.1016/j.envpol.2026.127671.

Machine learning frameworks for predicting pulmonary cell toxicities induced by metal ions in the atmosphere

2026-01-15

Metals in PM2.5 are closely associated with cardiopulmonary disease endpoints, potentially attributable to ionic species-induced oxidative stress effects. Computational prediction of metal ion respiratory toxicity remains challenging due to complex valence-dependent interactions. In this study, we constructed a predictive framework for high-throughput prediction of multiple metal ions toxicity endpoints. This framework leverages a 650-data-points multidimensional experimental dataset capturing dual pulmonary toxicological endpoints in cellular models, characterized by 31 valence-specific features, to identify key toxicological drivers simultaneously. Robust machine learning models established here accurately predicted metal ion respiratory toxicity (R2=0.89 for cell viability, ACC=0.86 for oxidative stress), validated externally (R2=0.74, ACC=0.70) by conducting Experimental validation on 10 new metal ions independent of the modeling dataset. Machine learning-driven feature selection ranked solubility, electronegativity, and cation charge of metal ions as top cell viability predictors, while the Pearson softness coefficient, molar mass, and density as vital parameters of oxidative stress. The predictive framework establishes property-toxicity relationships for PM2.5 metal ions, providing an effective tool for air pollution risk prioritization and mechanistic insights, thereby reducing unnecessary experimental burden.

Authors: Yang Huang, Xiu Chen, Tianqin Wang, Di Wu, Jiajun Ma, Hongwu Zhang, Xuehua Li, Qing Li

Full Source: Environmental pollution (Barking, Essex: 1987) 2026 Jan 15:127653. doi: 10.1016/j.envpol.2026.127653.

PHARMACEUTICAL/TOXICOLOGY

Urban Soils Encounter More Severe Per- and Polyfluoroalkyl Substance Contaminations and Associated Exposure Risks

2026-01-14

Per- and polyfluoroalkyl substances (PFASs), as persistent hazardous contaminants, have been increasingly identified in diverse environmental media. To date, however, information regarding the distribution and risks of PFASs in soils, particularly across urban-rural gradients, remains scarce. Therefore, this study performed high-resolution monitoring of PFASs at 119 sampling sites in the Qinhuai River Basin. The findings revealed that 18 targeted PFASs were identified in all soil samples, except for 6:2 Cl-PFESA, which exhibited a detection frequency of 78.2%; concurrently, legacy PFASs remained the predominant pollutants. Elevated concentration levels were observed in urban soils, with C5, C8-C13 PFCAs, C6-C8 PFSAs, 6:2 Cl-PFESA, and HFPO-TA identified as the main contributors. Variogram analysis found a robust spatial structure of PFASs with respect to geographic distance, indicating that the sampling design can accurately capture basin-scale patterns and identify localized hotspots (e.g., sites #64, #45, and #31). The geographic heterogeneity of soil PFASs was significantly regulated by foc, CEC, dust particles above 10 μm, and per capita GDP. In addition, seven sources were identified as explanatory variables for PFASs, exhibiting notable variation in their contributions between urban and rural soils. Legacy and emerging fluoropolymer-related activities dominated urban soil contamination, while firefighting and metal plating were the primary contributors to rural soil pollution. The dietary ingestion constituted the primary exposure pathway for soil PFASs, with children and urban residents possibly encountering a greater exposure risk; their estimated daily intake for individual PFASs varied from 0.01 to 30.1 ng/kg bw/day. This work provides critical insights into the occurrence and risks of PFASs in urban-rural gradient soils and highlights the importance of trade-offs in sampling strategies.

Authors: Yu Liang, Hua Zulin, Ma Wucheng, Shi Wenqing, Zhang Qiang, Guo Wenzhou, Xing Xiaolei

Full Source: Environmental pollution (Barking, Essex : 1987) 2026 Jan 14:127686. doi: 10.1016/j.envpol.2026.127686.

CHEMWATCH
Bulletin Board
Technical
JAN. 23, 2026

Toxicological characterization of flue gases from closed combustion of conventional solid fuels and co-burned plastic wastes

2026-01-15

Emissions from solid fuels used for home heating have a major impact on the air quality especially in colder months. While the health risks of smoke and emissions from solid fuels are well documented, the cellular effects of air pollutants from illegal burning of municipal waste remail poorly understood. This study aimed to evaluate the ecotoxic and cytotoxic effects of emissions from the co-combustion of plastic household waste and legal solid fuels. Controlled combustion experiments were carried out in a test stove, where solid fuels (black locust, turkey oak, black coal, brown coal, briquet) were co-fired with common household plastic waste types, (polyethylene terephthalate [PET], polyethylene [PE], polypropylene [PP], polystyrene [PS], and polyurethane [PU]). Flue gases were collected online in impingers containing high-purity water, filtered than subjected to chemical (TC and GC-MS) and toxicological analysis. The ecotoxicity was evaluated using the boar sperm motility inhibition test and the Vibrio fischeri bioluminescence inhibition test. Cytotoxicity was assessed by the flow cytometric live-dead staining on A549 cells. The results of ecotoxicity tests were classified as toxic to extremely toxic in all tested emission samples, correlating with the PAH and anhydrosugars concentrations. Cytotoxicity assay revealed that emissions from co-burning of plastic - especially PP, PE and PET- significantly reduced viability after 24 h compared to approved solid fuels. These findings highlight the increased toxicological risks associated with the illegal burning of household plastics and underline the need for stricter regulations and public awareness of the burning of household waste.

Authors: Balázs Kakasi, Flóra Judit Varga, Ádám Tóth, Beatrix Jancsek-Turóczi, András Hoffer, Szabolcs Tamás Nagy, Nóra Kováts, Katalin Hubai, András Gelencsér

Full Source: The Science of the total environment 2026 Jan 15:1014:181356. doi: 10.1016/j.scitotenv.2026.181356.

Novel approach to nitrate and macro-elements: carcino-spectrum of human health risk projections

2026-01-17

Groundwater is a vital yet increasingly vulnerable resource, with nitrate contamination posing a significant risk to human beings and the ecosystem. The present study offers an integrated, sustainability-

focused assessment of groundwater quality in India's eastern littoral state, based on groundwater quality data from 422 sampling locations. In 2024, nitrate concentrations peaked at 387 ppm, with an average of over 37 ppm; notably, more than 20% and 17% of samples exceeded the Bureau of Indian Standards and World Health Organization guidelines, respectively. Both non-carcinogenic and carcinogenic health risks were assessed, revealing that nitrate poses risks through oral and dermal exposure, while nitrite contributes to cancer risk through ingestion. Principal component analysis multiple linear regression highlighted strong correlations among nitrate and macro-elements such as sodium, chloride, calcium, magnesium, and potassium, indicating common anthropogenic sources such as fertilizer runoff and wastewater infiltration. Multivariate analysis showed that nitrate is the dominant contaminant influencing groundwater quality shifts from 2020 to 2024, largely driven by agricultural intensification and sewage disposal contributions. These findings underscore the critical importance of adopting strategic intervention policies and promoting resilient groundwater governance frameworks across national and international scales.

Authors: Kamalakanta Sahu, Sumedha Chakma, Y R Satyaji Rao

Full Source: Environmental monitoring and assessment 2026 Jan 17;198(2):140. doi: 10.1007/s10661-025-14974-8.

OCCUPATIONAL

High serum PFAS levels in a population after exposure through drinking water in western Tokyo, Japan and their half-lives estimation

Unknown

Background: Per- and polyfluoroalkyl substances (PFAS) have raised significant health concerns. In 2019, drinking water source was changed due to PFAS contamination in the Tama region, Tokyo, Japan. This study aims to determine the PFAS exposure levels after reduction in drinking water contamination, and to estimate the half-lives of linear isomers of perfluorooctane sulfonate (PFOS), perfluorohexane sulfonate (PFHxS), and perfluorooctanoic acid (PFOA) in serum samples from residents. Methods: 17 participants in 2020 and 2023 from Tama region, Tokyo, Japan (all females, age 53-83 years) were examined. PFAS concentrations in serum in 2023 were measured using gas chromatography-mass spectrometry. Biological half-lives were estimated using first-order kinetics model.

CHEMWATCH
Bulletin Board
Technical
JAN. 23, 2026

Results: The investigated population was exposed to six PFAS at levels associated with potential health risks, with 95% of them having total PFAS concentrations exceeding 20 ng/mL in 2023. Serum PFOS, PFHxS and PFOA levels decreased from 2000 to 2023 ($p < 0.05$ by paired t-test). The estimated half-lives for PFOS, PFHxS, and PFOA were 3.9 years (95% CI: 3.4-4.6), 5.7 years (95% CI: 4.6-7.5), and 8.0 years (95% CI: 6.0-10.0), respectively. After subtraction of background values in Japan, the estimated half-lives were 2.7 years (95% CI: 2.3-3.4) for PFOS, 5.6 years (95% CI: 4.5-7.4) for PFHxS, and 5.1 years (95% CI: 4.1-6.8) for PFOA. Conclusions: This study demonstrates participants had still higher serum PFAS levels and these PFAS elimination half-lives in the investigated Japanese population are at years order.

Authors: Zhaoqing Lyu, Kouji H Harada, Yoshihiko Sugii, Takenori Ueda, Junko Kimura-Kuroda, Shigeharu Nakachi

Full Source: Background: Per- and polyfluoroalkyl substances (PFAS) have raised significant health concerns. In 2019, drinking water source was changed due to PFAS contamination in the Tama region, Tokyo, Japan. This study aims to determine the PFAS exposure levels after reduction in drinking water contamination, and to estimate the half-lives of linear isomers of perfluorooctane sulfonate (PFOS), perfluorohexane sulfonate (PFHxS), and perfluorooctanoic acid (PFOA) in serum samples from residents. Methods: 17 participants in 2020 and 2023 from Tama region, Tokyo, Japan (all females, age 53-83 years) were examined. PFAS concentrations in serum in 2023 were measured using gas chromatography-mass spectrometry. Biological half-lives were estimated using first-order kinetics model. Results: The investigated population was exposed to six PFAS at levels associated with potential health risks, with 95% of them having total PFAS concentrations exceeding 20 ng/mL in 2023. Serum PFOS, PFHxS and PFOA levels decreased from 2000 to 2023 ($p < 0.05$ by paired t-test). The estimated half-lives for PFOS, PFHxS, and PFOA were 3.9 years (95% CI: 3.4-4.6), 5.7 years (95% CI: 4.6-7.5), and 8.0 years (95% CI: 6.0-10.0), respectively. After subtraction of background values in Japan, the estimated half-lives were 2.7 years (95% CI: 2.3-3.4) for PFOS, 5.6 years (95% CI: 4.5-7.4) for PFHxS, and 5.1 years (95% CI: 4.1-6.8) for PFOA. Conclusions: This study demonstrates participants had still higher serum PFAS levels and these PFAS elimination half-lives in the investigated Japanese population are at years order.

Authors: Zhaoqing Lyu, Kouji H Harada, Yoshihiko Sugii, Takenori Ueda, Junko Kimura-Kuroda, Shigeharu Nakachi

Full Source: Environmental health and preventive medicine 2026:31:3. doi: 10.1265/ehpm.25-00330.

CHEMWATCH
Bulletin Board
Technical
JAN. 23, 2026