

Bulletin Board

Contents

FEB. 26, 2021

(click on page numbers for links)

CHEMICAL EFFECTS

- Aquatic contaminants in Solomon Islands and Vanuatu: Evidence from passive samplers and Microtox toxicity assessment..... 3
- An ICP-MS Study for Quantitation of Nickel and Other Inorganic Elements in Urine Samples: Correlation of Patch Test Results with Lifestyle Habits 3
- Indoor secondary organic aerosols: Towards an improved representation of their formation and composition in models..... 4

ENVIRONMENTAL RESEARCH

- Environmental fate of cigarette butts and their toxicity in aquatic organisms: A comprehensive systematic review 5
- Optimized suspect screening approach for a comprehensive assessment of the impact of best management practices in reducing micropollutants transport in the Potomac River watershed 6
- Cross-tracking of faecal pollution origins, macronutrients, pharmaceuticals and personal care products in rural and urban watercourses 7

OCCUPATIONAL

- Exposure to parabens and associations with oxidative stress in adults from South China 8
- Concentrations of urinary biomarkers and predictors of exposure to pyrethroid insecticides in young, Polish, urban-dwelling men 8
- Health disorders among Egyptian municipal solid waste workers and assessment of their knowledge, attitude, and practice towards the hazardous exposure 9

PHARMACEUTICAL/TOXICOLOGY

- Sample preparation and instrumental methods for illicit drugs in environmental and biological samples: A review 10

CONTACT US

subscribers@chemwatch.net

tel +61 3 9572 4700

fax +61 3 9572 4777

1227 Glen Huntly Rd

Glen Huntly

Victoria 3163 Australia

Bulletin Board

Technical

FEB. 26, 2021

CHEMICAL EFFECTS

Aquatic contaminants in Solomon Islands and Vanuatu: Evidence from passive samplers and Microtox toxicity assessment

2021-02-11

Water Quality issues in many Pacific countries are rising, with the increase in coastal populations and associated urban runoff but management requires contamination issues in the aquatic environment to be identified and prioritised. In Vanuatu and Solomon Islands there are few laboratories and resources to assess for the presence or impact of complex chemical contaminants. The extent and impact of chemical contamination of the marine and coastal environment is poorly described. Passive chemical samplers were used to measure a range of aquatic pollutants around the capital cities, Honiara (Solomon Islands) and Port Vila (Vanuatu). We detected a range of chemicals indicative of agricultural and industrial contamination and a few sites had concerning concentrations of specific hydrocarbons and pesticides. The rapid ecotoxicology test, Microtox, indicated toxic impacts in rivers, coastal sites and urban drains This work provides new data on chemical contamination and possible impacts of that contamination for both countries. The techniques could be applied widely across the region to generate critical data for environmental management, guide monitoring efforts and measure the impact of policy or land-use changes.

Authors: A J Smith, J Barber, S Davis, C Jones, K K Kotra, S Losada, B P Lyons, M Mataka, K D Potter, M J Devlin

Full Source: Marine pollution bulletin 2021 Feb 11;165:112118. doi: 10.1016/j.marpolbul.2021.112118.

An ICP-MS Study for Quantitation of Nickel and Other Inorganic Elements in Urine Samples: Correlation of Patch Test Results with Lifestyle Habits

2021-02-20

Nickel (Ni) is a frequently used metal in the production of many products, and Ni exposure occurs in humans through food, inhalation, and skin. Studies reported Ni as the most common allergen diagnosed in the serial patch test. The main purpose of our study was to determine the concentration of Ni and other elements in the urine samples of individuals with Ni-sensitivity and to determine the effect of lifestyle habits on these variables. This study was conducted with 388 participants; additionally,

Water Quality issues in many Pacific countries are rising, with the increase in coastal populations and associated urban runoff but management requires contamination issues in the aquatic environment to be identified and prioritised.

Bulletin Board

Technical

FEB. 26, 2021

both Ni patch test and inorganic analysis (for 24 elements) method in urine with inductively coupled plasma-mass spectrometry (ICP-MS) were applied to all participants. Ninety-two (23.7%) of the participants were found to have nickel sensitivity with a mean urine concentration of 4.475 $\mu\text{g/g}$ creatinine (median=4.260; SD=2.527). The urine nickel concentration was significantly different between female and male participants ($p=0.001$). We found a significant correlation between Ni and other metals alongside various element pairs. The mean urine Ni concentration of the individuals with a positive Ni sensitivity test result was not different from that of the participants without Ni sensitivity (4.475 vs 4.256 $\mu\text{g/g}$ creatinine, respectively; $p=0.068$). The high accuracy, recovery, and repeatability data obtained from the analyses indicate that this study is efficient and appropriate for the quantitative determination of nickel and other elements in urine samples. Ni-containing objects and Ni-rich foods should be of concern for individuals with hypersensitivity reactions to the element.

Authors: Selda Mercan, Hayriye Vehid, Sevcan Semen, Ugur Celik, Murat Yayla, Burhan Engin

Full Source: Biological trace element research 2021 Feb 20. doi: 10.1007/s12011-021-02636-y.

Indoor secondary organic aerosols: Towards an improved representation of their formation and composition in models

2020-11

The formation of secondary organic aerosol (SOA) indoors is one of the many consequences of the rich and complex chemistry that occurs therein. Given particulate matter has well documented health effects, we need to understand the mechanism for SOA formation indoors and its resulting composition. This study evaluates some uncertainties that exist in quantifying gas-to-particle partitioning of SOA-forming compounds using an indoor detailed chemical model. In particular, we investigate the impacts of using different methods to estimate compound vapour pressures as well as simulating the formation of highly oxygenated organic molecules (HOM) via auto-oxidation on SOA formation indoors. Estimation of vapour pressures for 136 α -pinene oxidation species by six investigated methods led to standard deviations of 28-216%. Inclusion of HOM formation improved model performance across three of the six assessed vapour pressure estimation methods when comparing against experimental data, particularly when the NO_2 concentration was relatively high. We also explored the predicted SOA composition using two product

The formation of secondary organic aerosol (SOA) indoors is one of the many consequences of the rich and complex chemistry that occurs therein.

Bulletin Board

Technical

FEB. 26, 2021

classification methods, the first assuming the molecule is dominated by one functionality according to its name, and the second accounting for the fractional weighting of each functional group within a molecule. The SOA composition was dominated by the HOM species when the NO₂-to- α -terpineol ratio was high for both product classification methods, as these conditions promoted formation of the nitrate radical and hence formation of HOM monomers. As the NO₂-to- α -terpineol ratio decreased, peroxides and acids dominated the simple classification, whereas for the fractional classification, carbonyl and alcohol groups became more important.

Authors: M Kruza, G McFiggans, M S Waring, J R Wells, N Carslaw
Full Source: Atmospheric Environment: X 2020 Nov;240:10.1016/j.atmosenv.2020.117784. doi: 10.1016/j.atmosenv.2020.117784.

ENVIRONMENTAL RESEARCH

Environmental fate of cigarette butts and their toxicity in aquatic organisms: A comprehensive systematic review

2021-02-16

Cigarette butts (CBs) are the most frequently littered pieces of environmental wastes which are released both directly and indirectly into the environment and finally may reach aquatic environments and contaminate aquatic biomes. However, to date, there is no comprehensive review on the extent and magnitude of the potential effects of CBs on aquatic organisms. Hence, a systematic review of published studies was conducted in this paper to survey the fate of CBs in the aquatic environments and also the impacts of exposure to CBs on survival, growth, and reproduction of aquatic organisms. The gathered data showed that the leachates of CBs in the aquatic environment could extremely be toxic for various organisms and increasing the exposure time, increases the mortality rate. In addition, smoked filtered CBs with tobacco remnants have higher mortality rate compared to unsmoked filtered butts (USFs) for *Hymenochirus curtipes*, *Clarias gariepinus*, tidepool snails, *Atherinops affinis* and *Pimephales promelas*. The fate of CBs in the aquatic environments is affected by various factors, and prior to sinking they are floated for a long time (long distance). Hence, CBs and their associated toxic chemicals might be ingested by diverse aquatic organisms. However, further studies are necessary to understand the exact toxicity of CBs on different freshwater and marine organisms and also their fate in the aquatic media. The results of this review showed the essentiality of

Cigarette butts (CBs) are the most frequently littered pieces of environmental wastes which are released both directly and indirectly into the environment and finally may reach aquatic environments and contaminate aquatic biomes.

Bulletin Board

Technical

FEB. 26, 2021

regulations to prevent the release of chemical and toxic compounds into the aquatic environments.

Authors: Sina Dobaradaran, Farshid Soleimani, Razegheh Akhbarizadeh, Torsten C Schmidt, Maryam Marzban, Reza BasirianJahromi
Full Source: Environmental research 2021 Feb 16;110881. doi: 10.1016/j.envres.2021.110881.

Optimized suspect screening approach for a comprehensive assessment of the impact of best management practices in reducing micropollutants transport in the Potomac River watershed

2021-01-19

The vast number of chemicals potentially reaching aquatic environment pose a challenge in maintaining the quality of water resources. However, best management practices to improve water quality are typically focused on reducing nutrient transport without assessing how these practices may impact the occurrence of micropollutants. The potential for co-management of nutrients and organic micropollutants exists, but few studies have comprehensively evaluated the suite of contaminants associated with different water quality management practices (riparian zone restoration, stormwater management, etc.). Furthermore, most studies dealing with the determination of micropollutants in environmental samples include only a limited number of target analytes, leaving many contaminants undetected. To address this limitation, there has been a gradual shift in environmental monitoring from using target analysis to either suspect screening analysis (SSA) or non-targeted analysis (NTA), which relies on accurate mass measurements, mass spectral fragmentation patterns, and retention time information obtained using liquid chromatography coupled to high-resolution mass spectrometry. The work presented in this paper focuses on a wide-scope detection of micropollutants in surface water samples from the Potomac River watershed (United States). An in-house database composed of 1039 compounds based on experimental analysis of primary standards was established, and SSA workflow was optimized and applied to determine the presence of micropollutants in surface water. A total of 103 micropollutants were detected in the samples, some of which are contaminants that were not previously monitored and belong to various classes such as pharmaceuticals, personal care products, per-and polyfluoroalkyl substances and other persistent industrial chemicals. The impact of best management practices being implemented for nitrogen and phosphorus reductions were also assessed for their

The vast number of chemicals potentially reaching aquatic environment pose a challenge in maintaining the quality of water resources.

Bulletin Board

Technical

FEB. 26, 2021

potential to reduce micropollutant transport. This work illustrates the advantages of suspect screening methods to determine a large number of micropollutants in environmental samples and reveals the potential to co-manage a diverse array of micropollutants based on shared transport and transformation mechanisms in watersheds.

Authors: Mary Grace E Guardian, Ping He, Alysson Bermudez, Shuiwang Duan, Sujay S Kaushal, Erik Rosenfeldt, Diana S Aga
Full Source: Water research X 2021 Jan 19;11:100088. doi: 10.1016/j.wroa.2021.100088.

Cross-tracking of faecal pollution origins, macronutrients, pharmaceuticals and personal care products in rural and urban watercourses

2021-02

This study describes microbial and chemical source tracking approaches for water pollution in rural and urban catchments. Culturable faecal indicator bacteria, represented by *Escherichia coli*, were quantified. Microbial source tracking (MST) using host-specific DNA markers was applied to identify the origins of faecal contamination. Chemical source tracking (CST) was conducted to determine contaminants of emerging concern (CEC) of human/anthropogenic origin, including pharmaceuticals and personal care products (PPCPs) and endocrine-disrupting chemicals (EDCs). In addition, the eutrophication-causing macronutrients nitrogen and phosphorus were studied. MST tests revealed both anthropogenic and zoogenic faecal origins, with a dominance of human sources in the urban stream; non-human/environmental sources were prevalent in the rural creek. CST analyses revealed a higher number of CECs in the urban stream than in the rural watercourse. Positive correlations between PPCPs and both *E. coli* and the human DNA marker were uncovered in the urban stream, while in the rural creek, PPCPs were only highly correlated with the anthropogenic marker. Interestingly, macronutrients were strongly associated with primary faecal pollution origins in both watercourses. This correlation pattern determines the main pollutant contributors (anthropogenic or zoogenic) to eutrophication.

Authors: Lisa Paruch, Adam M Paruch

Full Source: Water science and technology : a journal of the International Association on Water Pollution Research 2021 Feb;83(3):610-621. doi: 10.2166/wst.2020.603.

This study describes microbial and chemical source tracking approaches for water pollution in rural and urban catchments.

Bulletin Board

Technical

FEB. 26, 2021

OCCUPATIONAL

Exposure to parabens and associations with oxidative stress in adults from South China

2021-02-03

Parabens are widely applied as preservatives in cosmetics, drugs and food. Previous studies suggested that parabens could exhibit potential risks to human health. However, data on human exposure levels and health effects of parabens remain limited, especially in the potential effects on DNA oxidative stress. This study aimed to investigate urinary levels of parabens in adults from South China and explore the relationships between urinary parabens and DNA oxidative stress. Five short chain parabens, including methyl paraben (MeP), ethyl paraben (EtP), n-propyl paraben (PrP), butyl paraben (BuP) and benzyl paraben (BzP), were determined in urine from 319 adults in Shenzhen, China. MeP, EtP and PrP were frequently detected in urine samples (detection frequencies >66.5%), suggesting broad exposure in South China adults. Median concentrations of MeP, EtP, PrP, BuP and BzP were 5.78, 0.39, 0.35, 0.01 and 0.02 µg/L, respectively. A significantly positive correlation was observed between the urinary concentrations of MeP and PrP ($p < 0.01$), suggesting similar sources for these two chemicals. In addition, participants with alcohol consumption exhibited significantly lower paraben concentrations in urine than those without alcohol drinking ($p < 0.05$). Significant association was observed between urinary concentrations of parabens and 8-hydroxy-2'-deoxyguanosine (8-OHdG) levels ($p < 0.01$), while no significant dose-response relationship was found ($p > 0.05$). A potential risk from PrP exposure was found in South China adults.

Authors: Yang Zhao, Yanlin Liu, Yining Chen, Xiaoling Wu, Qinru Xiao, Chun Li, Minhui Li, Wanting Hu, Huiqiao Gu, Shaoyou Lu

Full Source: The Science of the total environment 2021 Feb 3;774:144917. doi: 10.1016/j.scitotenv.2020.144917.

Parabens are widely applied as preservatives in cosmetics, drugs and food.

Concentrations of urinary biomarkers and predictors of exposure to pyrethroid insecticides in young, Polish, urban-dwelling men

2021-02-06

Pyrethroid insecticides are a class of pesticides with multiple agricultural and residential applications. However, widespread use of these chemicals may pose a threat to human health. Biomarkers of pyrethroid exposure are frequently detected in populations around the world, but some groups

Bulletin Board

Technical

FEB. 26, 2021

may be underrepresented. Moreover, there is an ongoing debate on factors contributing to pyrethroid burden in humans. To address these problems, we measured urinary biomarkers of pyrethroid exposure in urine samples from 306 young men living in urban area of Łódź, Poland, and gathered questionnaire data to identify predictors of exposure. Limit of detection (LOD) of gas chromatography-mass spectrometry (GC-MS) method was 0.1 ng/mL for all quantified pyrethroid metabolites, namely cis-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (cis-DCCA), trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (trans-DCCA), cis-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid (cis-DBCA), and 3-phenoxybenzoic acid (3-PBA). Detection rate ranged from 32% (cis-DBCA) to 76% (trans-DCCA). Concentrations of urinary biomarkers in studied sample were in lower range of these observed in similar studies, with unadjusted geometric means (GMs) of most prevalent biomarkers, trans-DCCA and 3-PBA, equal to 0.268 and 0.228 ng/mL, respectively. As for questionnaire data, the statistical analysis revealed that non-dietary factors, especially dog ownership and pesticide use on household pets, contribute significantly to urinary trans-DCCA and 3-PBA concentrations ($p \leq 0.009$). Moreover, a few dietary sources of exposure were identified, such as seeds and nuts consumption for 3-PBA ($p < 0.001$) and vegetable juice intake for trans-DCCA ($p = 0.015$). Multivariate analyses further highlighted the importance of non-dietary factors in pyrethroid exposure. Compared to other works, our results confirm widespread exposure to pyrethroids observed in other studies and stress the role of residential pyrethroid use in pyrethroid burden in humans.

Authors: Wojciech Rodzaj, Malwina Wileńska, Anna Klimowska, Emila Dziejirska, Joanna Jurewicz, Renata Walczak-Jędrzejowska, Jolanta Słowikowska-Hilczler, Wojciech Hanke, Bartosz Wielgomas
Full Source: The Science of the total environment 2021 Feb 6;773:145666.
doi: 10.1016/j.scitotenv.2021.145666.

Health disorders among Egyptian municipal solid waste workers and assessment of their knowledge, attitude, and practice towards the hazardous exposure

2021-02-16

Solid waste workers are exposed to variety of injuries and diseases at work. To study health disorders among workers in the waste management field and to assess their knowledge attitude and practice (KAP) towards hazardous exposure and safety measures. A cross-sectional study was carried out on 275 waste workers and an equal number as a group

Solid waste workers are exposed to variety of injuries and diseases at work.

Bulletin Board

Technical

FEB. 26, 2021

of controls from workers' relatives or workers not involved in waste management. Workers completed a self-administered or interviewer-based questionnaire containing data about (i) knowledge, e.g., management of wastes, types of hazards associated with solid waste management, and safety measures; (ii) attitude, e.g., opinions about mode of transmission of infection and safety measures; and (iii) practice, e.g., available safety measures to prevent exposure to hazards. Health education sessions were carried out with pre- and post-assessment of KAP. Both groups were assessed regarding the health status through history, general, and local examination (respiratory system and skin) in addition to spirometric measurements and complete blood count. A total of 275 exposed solid waste workers and 275 controls were included. A significantly higher prevalence of symptoms regarding respiratory, gastrointestinal, renal, musculoskeletal, and dermatological systems were detected among the exposed group than the controls ($P < 0.05$). Significantly lower levels of RBCs, Hb, HCT, and MCH were reported among the exposed group than the controls ($P < 0.05$). Among the exposed group vs. controls, FEV1 reported 99.75 ± 13.35 vs. 104.83 ± 10.47 ($P < 0.001$), FEV1/FVC% reported 98.88 ± 15.32 vs. 102.72 ± 14.36 ($P = 0.003$), FEF25-75% reported 99.64 ± 17.06 vs. 103.07 ± 19.38 ($P = 0.029$), and PEF% reported 58.73 ± 16.31 vs. 62.12 ± 12.91 ($P = 0.007$). Unsatisfactory knowledge was reported among 64% of solid waste workers, 69.1% had negative attitude, and 73.8% had unsafe practice. KAP was significantly higher post than pre-health education ($P < 0.001$). Respiratory, gastrointestinal, and skin infections were common among solid waste workers. Assessment of KAP towards management of wastes, transmission of infection, exposure to sharps, and safety measures showed poor levels that got improved after health education. To maintain good health among solid waste workers, direct supervision with periodic medical examination and focused continuous health education are required.

Authors: Zeinab A Kasemy, Diane S Rohlman, Asmaa A Abdel Latif
Full Source: Environmental science and pollution research international 2021 Feb 16. doi: 10.1007/s11356-021-12856-3.

PHARAMACEUTICAL/TOXICOLOGY

Sample preparation and instrumental methods for illicit drugs in environmental and biological samples: A review

2021-02-02

Detection of illicit drugs in the environmental samples has been challenged as the consumption increases globally. Current review

Detection of illicit drugs in the environmental samples has been challenged as the consumption increases globally.

Bulletin Board

Technical

FEB. 26, 2021

examines the recent developments and applications of sample preparation techniques for illicit drugs in solid, liquid, and gas samples. For solid samples, traditional sample preparation methods such as liquid-phase extraction, solid-phase extraction, and the ones with external energy including microwave-assisted, ultrasonic-assisted, and pressurized liquid extraction were commonly used. The sample preparation methods mainly applied for liquid samples were microextraction techniques including solid-phase microextraction, microextraction by packed sorbent, dispersive solid-phase extraction, dispersive liquid-liquid microextraction, hollow fiber-based liquid-phase microextraction, and so on. Capillary microextraction of volatiles and airborne particulate sampling were primarily utilized to extract illicit drugs from gas samples. Besides, the paper introduced recently developed instrumental techniques applied to detect illicit drugs. Liquid chromatograph mass spectrometry and gas chromatograph mass spectrometry were the most widely used methods for illicit drugs samples. In addition, the development of ambient mass spectrometry techniques, such as desorption electrospray ionization mass spectrometry and paper spray mass spectrometry, created potential for rapid in-situ analysis.

Authors: Xinlv Chen, Xinyan Wu, Tiangang Luan, Ruifen Jiang, Gangfeng Ouyang

Full Source: Journal of chromatography. A 2021 Feb 2;1640:461961. doi: 10.1016/j.chroma.2021.461961.