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CHEMICAL EFFECTS

Occurrence of major organic UV filters in aquatic environment and their endocrine disruption potentials: A mini-review

2021-05-14

Organic UV filters are frequently used in daily lives, and hence ubiquitously detected in the aquatic environment worldwide. Most monitoring efforts and toxicological studies are however limited to a few chemicals like BP-3. In the present study, we chose other major organic UV filters, such as avobenzone (AVB), homosalate (HS), octisalate (OS), and octocrylene (OC), and reviewed information on their use, environmental occurrences, and endocrine disruption effects, available to date. Organic UV filters are used in high volume in many consumer applications, not only in sunscreen products but also in cosmetics, personal care products, home products, and food packaging. Environmental monitoring worldwide reveals that recreational coastal waters are among the hot spots of their contamination. Increasing number of experimental studies indicate that organic UV filters such as OMC, AVB, and HS may cause disruptions in sex hormones. AVB and OMC can also influence thyroid function in experimental models. Observations in human population are rarely made, but OMC and OC have been associated with decreased androgenicity and increase of PCOS, respectively. Further investigations are warranted to fill the knowledge gaps identified in the present study, to help develop relevant safety screening measures for organic UV filters. This article is protected by copyright. All rights reserved.

Organic UV filters are frequently used in daily lives, and hence ubiquitously detected in the aquatic environment worldwide.

Authors: Ba Reum Kwon, Kyungho Choi

Full Source: Integrated environmental assessment and management 2021 May 14. doi: 10.1002/ieam.4449.

Application of the adverse outcome pathway framework to predict the toxicity of chemicals in the semiconductor manufacturing industry

2021-05-05

Background: To solve current issues using big data, solve current issues related to the semiconductor and electronics industry, I tried to establish the data for each toxicity mechanism for adverse outcome pathway (AOP) for the exposure.

Objective: I planned to increase the efficiency of human hazard assessment by searching, analyzing, and linking test data on the

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relationship between key events occurred at each level, which are the biological targets of chemicals in semiconductor manufacturing.

Results: It was found that 48 kinds of chemicals had 11 AOPs, while 103 chemicals had multiple AOPs, and 26 had case evidence. As a result of AOP analysis, it was found that a total of 320 chemicals had 42 AOPs, and 190 major chemicals corresponded to 11 AOPs. It was found necessary to develop a complex AOP and secure an (inhalation or dermal) exposure scenario for combined exposure at work. As a comparative search (41 out of 190 chemicals) of biomarkers specific to occupational diseases, 12 biomarkers were found to be related to breast cancer. The AOPs for 50 specific chemicals were presented, together with occupational disease-specific AOPs and key events relationship from 50 chemicals, and taxonomic classification for each AOP analysis could be found. With a comparative search, 41 out of 190 chemicals were associated with specific biomarkers for occupational diseases, and 12 mRNA or protein biomarkers were found to be related to breast cancer by cross-validation with the attached Table 24 of the Enforcement Regulations of the OSHAct and the CTD.

Conclusion: The mechanism of occupational diseases caused by chemicals was presented, together with pathological preventions. I believe that a strategy is needed to expand the target organization for each chemical by linking with activities, such as work environment measurement, and cooperating with screening items and methods suitable for toxic chemicals, like AOP tools.

Supplementary information: The online version contains supplementary material available at 10.1007/s13273-021-00139-4.

Many household and personal care chemicals (HPCCs) are of environmental concern due to their potential toxicity to humans and wildlife.

Authors: Kyung-Taek Rim

Full Source: Molecular & cellular toxicology 2021 May 5;1-21. doi: 10.1007/s13273-021-00139-4.

Assessing the distributions and fate of household and personal care chemicals (HPCCs) in the Songhua Catchment, Northeast China

2021-05-03

Many household and personal care chemicals (HPCCs) are of environmental concern due to their potential toxicity to humans and wildlife. However, few studies investigate the spatiotemporal variations and fate of HPCCs in large-scale river systems. Here, river water and sediment samples from the Songhua River in Northeast China were analyzed for seven classes of HPCCs. Correlation analysis suggested similar sources and environmental behavior for compounds from the

same HPCC classes. In the river water, the concentrations of most HPCCs in the cold season were significantly higher than that of the warm season ($p < 0.01$). Significantly higher levels of target compounds were found in the downstream water samples of a city, suggesting the influence of human activities on the distributions of HPCCs. The concentrations and distributions of most HPCCs were controlled by primary emission sources. The derived dissolved concentrations of HPCCs suggested that small amounts of caffeine and parabens were partitioned onto particles, while large amounts of many other HPCCs were bound to the particle phase. Water-sediment distribution coefficients (log Kd) ranged from 1.59 for caffeine to 3.95 for benzalkonium chloride-C14. This work presents new insights into the environmental behavior of HPCCs and the factors affecting their fate in river systems.

Authors: Wen-Long Li, Zi-Feng Zhang, Yi-Fan Li, Hayley Hung, Yi-Xing Yuan
Full Source: The Science of the total environment 2021 May 3;786:147484. doi: 10.1016/j.scitotenv.2021.147484.

ENVIRONMENTAL RESEARCH

Sorption of micropollutants on selected constructed wetland support matrices

2021-07

Micropollutants (MPs) are organic chemicals that are present in the environment at low concentrations (ng/L-µg/L), for example pharmaceuticals. A constructed wetland (CW) is a promising post-treatment technique to remove MPs from wastewater effluent. Selecting a suitable material for support matrix is important when designing such a CW. Nine materials were studied as potential support matrices: Light Expanded Clay Aggregates (LECA), compost, bark, granulated activated carbon (GAC), biochar, granulated cork, lava rock, sand and gravel. Batch experiments were conducted to study MP removal by nine materials in phosphate buffer with 5 or 50 µg/L MPs, or wastewater effluent with 50 µg/L of MPs. GAC and biochar removed almost all MPs in both phosphate buffer and wastewater effluent, followed by bark, compost, granulated cork. Sand, gravel, LECA and lava rock removed less than 30% of most MPs in both matrixes. Based on set criteria (e.g. removal efficiency), biochar, bark, compost, LECA and sand were selected, and used in combinations in column studies to test their overall performance. A combination of bark and biochar performed the best on MP removal, as 4 MPs were highly (70%-100%) removed, 4 MPs were moderately (30%-70%) removed while only 3 MPs were hardly removed. The main

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flow regime of this combination was both plug flow and dispersive flow. Moreover, we hypothesized to apply bark and biochar in a CW. Based on the assumptions and calculations, some benefits are expected, such as increasing MP removal and extending operation time.

Authors: Yu Lei, Alette Langenhoff, Harry Bruning, Huub Rijnaarts
Full Source: Chemosphere 2021 Jul;275:130050. doi: 10.1016/j.chemosphere.2021.130050.

Metal pollution of soil, plants, feed and food in the Niger Delta, Nigeria: Health risk assessment through meat and fish consumption

2021-05-11

This study was aimed at determining mainly the concentrations of As and other metals (Cd, Cu, Hg, Pb, V and Zn) in samples of feed, soil, plants and foods (fish, chicken, goat and cow meat) grown and consumed in six areas of Niger Delta, Nigeria (Choba, Khana, Trans Amadi, Eleme, Uyo and Yenagoa). Principal Component Analysis (PCA) models were used for identifying groups of variables (i.e., elements) based on the loadings and groups of samples (i.e., plants, soil, fish, meet, feed) according to the scores that contributed most to the environmental pollution in each Nigerian area. In Choba and Khana sites, the results showed a cluster of elements like As, Pb, V and Zn, mostly associated with samples of goat and cow meat, as well as soils, and separated from another cluster of metals composed by Cu and Hg with different origin. In Trans Amadi area, a clustering of As, Cd and V was found associated to different types of meat (chicken, goat, and cow) located in the opposite side of Cu and Hg, which correlated to plants and soil. In Eleme, the strongest loadings were obtained for V and Zn associated with soil and meat (goat and cow) samples and separated from As and Cd. Finally, in Uyo and Yenagoa, dominant elements were As, Cu, Pb and Zn, with proximity to cow and goat liver samples, while Cd and V corresponded to a different pollution pattern. Lead intake trough meat and fish consumption for adults and children were much higher than the tolerable limits set by international organizations. The results of this study should allow a better understanding of the complex phenomenon of metal pollution in the feed-to-food chain and human health in Nigeria, which should help to

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manage a pollution reduction strategy and give priorities of research and monitoring.
Authors: Esther Amaka Okoye, Beatrice Bocca, Flavia Ruggieri, Anthonett N Ezejiofor, Ify L Nwaogazie, Jose L Domingo, Joaquim Rovira, Chiara Frazzoli, Orish E Orisakwe
Full Source: Environmental research 2021 May 11;111273. doi: 10.1016/j.envres.2021.111273.

Chemical pollution: A growing peril and potential catastrophic risk to humanity

2021-05-12
Anthropogenic chemical pollution has the potential to pose one of the largest environmental threats to humanity, but global understanding of the issue remains fragmented. This article presents a comprehensive perspective of the threat of chemical pollution to humanity, emphasising male fertility, cognitive health and food security. There are serious gaps in our understanding of the scale of the threat and the risks posed by the dispersal, mixture and recombination of chemicals in the wider environment. Although some pollution control measures exist they are often not being adopted at the rate needed to avoid chronic and acute effects on human health now and in coming decades. There is an urgent need for enhanced global awareness and scientific scrutiny of the overall scale of risk posed by chemical usage, dispersal and disposal.
Authors: Ravi Naidu, Bhabananda Biswas, Ian R Willett, Julian Cribb, Brajesh Kumar Singh, C Paul Nathanail, Frederic Coulon, Kirk T Semple, Kevin C Jones, Adam Barclay, Robert John Aitken
Full Source: Environment international 2021 May 12;156:106616. doi: 10.1016/j.envint.2021.106616.

Anthropogenic chemical pollution has the potential to pose one of the largest environmental threats to humanity, but global understanding of the issue remains fragmented.

Effects of COVID-19 on the environment: An overview on air, water, wastewater, and solid waste

2021-04-30
The COVID-19 pandemic has hit the world hardly as of the beginning of 2020 and quickly spread worldwide from its first-reported point in early Dec. 2019. By mid-March 2021, the COVID-19 almost hit all countries worldwide, with about 122 and 2.7 million confirmed cases and deaths, respectively. As a strong measure to stop the infection spread and deaths, many countries have enforced quarantine and lockdown of many activities. The shutdown of these activities has resulted in large economic losses. However, it has been widely reported that these measures have

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resulted in improved air quality, more specifically in highly polluted areas characterized by massive population and industrial activities. The reduced levels of carbon, nitrogen, sulfur, and particulate matter emissions have been reported and confirmed worldwide in association with lockdown periods. On the other hand, ozone levels in ambient air have been found to increase, mainly in response to the reduced nitrogen emissions. In addition, improved water quality in natural water resources has been reported as well. Wastewater facilities have reported a higher level of organic load with persistent chemicals due to the increased use of sanitizers, disinfectants, and antibiotics. The solid waste generated due to the COVID-19 pandemic was found to increase both qualitatively and quantitatively. This work presents and summarizes the observed environmental effects of COVID-19 as reported in the literature for different countries worldwide. The work provides a distinct overview considering the effects imposed by COVID-19 on the air, water, wastewater, and solid waste as critical elements of the environment.
Authors: Khaled Elsaid, Valentina Olabi, Enas Taha Sayed, Tabbi Wilberforce, Mohammad Ali Abdelkareem
Full Source: Journal of environmental management 2021 Apr 30;292:112694. doi: 10.1016/j.jenvman.2021.112694.

OCCUPATIONAL

Occurrence of parabens, triclosan and triclocarban in paired human urine and indoor dust from two typical cities in China and its implications for human exposure

2021-05-03
Parabens, triclosan (TCS) and triclocarban (TCC) are emerging endocrine disrupting chemicals, which are commonly used in personal care products and household applications in daily life. Due to their adverse health effects, human exposure to these chemicals has been a public concern. Despite evidence showing different exposure pathways of these chemicals, few studies have examined contribution of certain exposure to total human exposure. In this study, we measured six parabens, TCS and TCC in 129 indoor dust samples and these chemicals plus four paraben metabolites in 203 urine samples from two different cities in China (Suizhou, a typical small city in central China and Beijing, the capital of China). The median concentrations of ∑6Parabens (1050 ng/g) and ∑TCS + TCC (565 ng/g) in dusts from Beijing were 1.9-3.3 times higher than those from Suizhou (∑6Parabens: 314, ∑TCS + TCC: 294 ng/g). The ∑6Parabens in

Parabens, triclosan (TCS) and triclocarban (TCC) are emerging endocrine disrupting chemicals, which are commonly used in personal care products and household applications in daily life.

urines from Suizhou and Beijing were in the range of 0.208-645 and 0.455-2300 μg/g Creatinine (Cr), respectively. The ∑TCS + TCC concentrations in urine were 1-2 orders of magnitude lower than those found for ∑6Parabens. Comparatively, women had relatively higher body burden of parabens than men, which was more noticeable when considering the use of skin care products. In this regard, relatively higher levels of parabens were also found in women in couples. Positive correlations were found between concentrations of methyl-paraben (MeP) and ethyl-paraben (PrP) in paired dust and urine samples ($p < 0.05$). Human exposure to such chemicals was evaluated. Based on the measured concentrations in paired human urine and indoor dust samples, our results provided direct evidence that the contribution of indoor dust ingestion to the total exposure was minor. These findings are essential for clarifying the sources and potential exposure routes of these chemicals in humans.

Authors: Yun Wang, Guoliang Li, Qingqing Zhu, Chunyang Liao

Full Source: The Science of the total environment 2021 May 3;786:147485. doi: 10.1016/j.scitotenv.2021.147485.

Elemental plasma content and urinary excretion in vineyard farmers occupationally exposed to pesticides in southern Brazil

2021-05-15

This is a cross-sectional study with data and biological material collection from vineyard farmers in southern Brazil. An interview was carried out through a questionnaire developed according to the reference guide of the state government. Plasma and urine samples were screened for Aluminum, Chromium, Manganese, Copper, Nickel, Cobalt, Zinc, Arsenic, Selenium, Cadmium, Antimony, Barium, Mercury, Lead and Uranium, with a technique for fast determination of these elemental contents in biological material utilizing dynamic reaction cell inductively coupled mass spectrometry. Principal component analysis was used to identify associations between these elemental contents in biological samples and the information obtained from the interviews. The farmers showed some trace elements in plasma and urine at a higher concentration than unexposed populations from other studies. This study highlights recent findings of trace elements in biological material and their association with characteristics of pesticide use. In addition, it also contributes to the gap in the literature regarding trace elements content in plasma and urine of workers exposed to pesticides.

Authors: Renata Sano Lini, Raul Gomes Aguera, Danielle Hoeltgebaum, Fernanda Pollo Paniz, Tatiana Pedron, Silvia Capelari, Lucilena Rebelo

This is a cross-sectional study with data and biological material collection from vineyard farmers in southern Brazil.

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Monteiro, Miguel Machinski Junior, Samuel Botião Nerilo, Bruno Lemos Batista, Magda Lúcia Félix de Oliveira, Simone Aparecida Galerani Mossini

Full Source: Environmental science and pollution research international 2021 May 15. doi: 10.1007/s11356-021-14384-6.

PHARAMACEUTICAL/TOXICOLOGY

Radiation-Induced Lens Opacity and Cataractogenesis: A Lifetime Study Using Mice of Varying Genetic Backgrounds

2021-05-13

Recent epidemiological findings and reanalysis of historical data suggest lens opacities resulting from ionizing radiation exposures are likely induced at lower doses than previously thought. These observations have led to ICRP recommendations for a reduction in the occupational dose limits for the eye lens, as well as subsequent implementation in EU member states. The EU CONCERT LDLensRad project was initiated to further understand the effects of ionizing radiation on the lens and identify the mechanism(s) involved in radiation-induced cataract, as well as the impact of dose and dose-rate. Here, we present the results of a long-term study of changes to lens opacity in male and female adult mice from a variety of different genetic (radiosensitive or radioresistant) backgrounds, including mutant strains Ercc2 and Ptch1, which were assumed to be susceptible to radiation-induced lens opacities. Mice received 0.5, 1 and 2 Gy 60Co gamma-ray irradiation at dose rates of 0.063 and 0.3 Gy min-1. Scheimpflug imaging was used to quantify lens opacification as an early indicator of cataract, with monthly observations taken postirradiation for an 18-month period in all strains apart from 129S2, which were observed for 12 months. Opacification of the lens was found to increase with time postirradiation (with age) for most mouse models, with ionizing radiation exposure increasing opacities further. Sex, dose, dose rate and genetic background were all found to be significant contributors to opacification; however, significant interactions were identified, which meant that the impact of these factors was strain dependent. Mean lens density increased with higher dose and dose rate in the presence of Ercc2 and Ptch1 mutations. This project was the first to focus on low (<1 Gy) dose, multiple dose rate, sex and strain effects in lens opacification, and clearly demonstrates the importance of these experimental factors in radiobiological investigations on the lens. The results provide insight into the effects of ionizing radiation on the lens

Recent epidemiological findings and reanalysis of historical data suggest lens opacities resulting from ionizing radiation exposures are likely induced at lower doses than previously thought.

as well as the need for further work in this area to underpin appropriate radiation protection legislation and guidance.

Authors: R A McCarron, S G R Barnard, G Babini, C Dalke, J Graw, S Leonardi, M Mancuso, J E Moquet, D Pawliczek, S Pazzaglia, I De Stefano, E A Ainsbury

Full Source: Radiation research 2021 May 13. doi: 10.1667/RADE-20-00266.1.