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ENVIRONMENTAL RESEARCH

Modelling azo dye removal by sono-fenton processes using response surface methodology and artificial neural network approaches

2019-09-02

Textile industry wastewaters, which cause serious problems in the environment and human health, include synthetic dyes, complex organic pollutants, surfactants, and other toxic chemicals and therefore must be removed by advanced treatment methods. Determination of appropriate treatment conditions for efficient use of advanced treatment methods is an important and necessary step. In the last thirty years, the Artificial Neural Network-Genetic Algorithm (ANN-GA) and Response Surface Methodology (RSM) have emerged as the most effective empirical modelling and optimisation methods especially for nonlinear systems. In this study, Reactive Red 195 azo dyestuff was chosen as the target pollutant. The colour removal efficiency was modelled and optimized as a function of Sono-Fenton conditions such as H₂O₂ dosage, Fe²⁺ dosage, initial pH value, ultrasound power, and ultrasound frequency, using ANN-GA and RSM. The generalization and predictive ability of these methods were compared using the results of the 46 experimental sets generated by the Box-Behnken design. The mean square errors for these models are 3.01612 and 0.00295, and the regression coefficients showing the superiority of ANN in determining nonlinear behaviour are 0.9856 and 0.9164, respectively. In optimal conditions, the prediction errors with hybrid ANN-GA and RSM models are 0.002% and 3.225%, respectively.

Authors: Baştürk E, Alver A.

Full Source: Journal of Environmental Management. 2019 Jul 24; 248:109300. doi: 10.1016/j.jenvman.2019.109300. [Epub ahead of print]

In this study, Reactive Red 195 azo dyestuff was chosen as the target pollutant and the colour removal efficiency was modelled and optimised as a function of Sono-Fenton conditions using ANN-GA and RSM.

The importance of cyanobacteria and microalgae present in aerosols to human health and the environment - Review study

2019-09-02

Airborne microalgae and cyanobacteria are among the least studied organisms in aerobiology. While those of them living in freshwater and seawater are well recognised, those constituting the components of aerosols are rarely the focus of research. However, their presence has been noted by scientists from all over the world. The presence of these organisms is not indifferent to the environment as they participate in

the formation of clouds and influence both the hydrological cycle and Earth's climate. Recent studies have concentrated mostly on the negative impact of airborne cyanobacteria and microalgae, as well as the toxic compounds they produce, on human health. This review focuses on measurement results published on those bioaerosols, combining the achievements of scientists from the last century with the latest reports and trends. Within it gaps in current knowledge are discussed, including the role of airborne organisms in the transport of harmful chemicals like PAHs and heavy metals. The current studies on which it is based emphasise the advantages and disadvantages of the measurement methods used in sampling and analysing. It also visualizes, in the form of maps, where research on bioaerosols has so far been conducted, while at the same time determining the share of organisms potentially dangerous to human health. In addition, the authors have also tried to recommend future research directions for both environmental and laboratory-based studies.

Authors: Wiśniewska K, Lewandowska AU, Śliwińska-Wilczewska S.

Full Source: Environment International. 2019 Jul 24; 131:104964. doi: 10.1016/j.envint.2019.104964. [Epub ahead of print]

Occurrence and emission of phthalates and non-phthalate plasticisers in sludge from wastewater treatment plants in Korea

2019-09-02

Phthalates are endocrine-disrupting chemicals that cause adverse health effects in wildlife and humans. Due to domestic and global regulations of phthalates in commercial products, non-phthalate plasticisers (NPPs) have been introduced into industrial markets. Few studies have been conducted on the occurrence of phthalates and NPPs in sludge from wastewater treatment plants (WWTPs). In this study, sludge samples were collected from 40 WWTPs in Korea to investigate the occurrence, compositional profiles, and emission flux of phthalates and NPPs. Total concentrations of phthalates and NPPs in sludge ranged from 4.7 to 1400 (mean: 110) $\mu\text{g/g}$ dry weight and from 0.17 to 780 (mean: 28.0) $\mu\text{g/g}$ dry weight, respectively. Di(2-ethylhexyl) phthalate (DEHP) was a predominant compound, suggesting widespread consumption in Korea. Di(2-ethylhexyl)terephthalate (DEHT) was dominant in industrial sludge samples, whereas di-isononyl cyclohexane-1,2-dicarboxylate (DINCH) and trioctyl trimellitate (TOTM) were dominant in domestic sludge. This implies different consumption patterns of phthalate alternatives by industry and domestic activities. Concentrations of NPPs were significantly correlated with those of high-molecular-weight (HMW) phthalates, indicating that

In this study, sludge samples were collected from 40 WWTPs in Korea to investigate the occurrence, compositional profiles, and emission flux of phthalates and non-phthalate plasticisers.

HMW phthalates were preferentially replaced by NPPs. The emission fluxes of phthalates via domestic WWTP activities were higher than those measured for industrial WWTPs, while the emission fluxes of NPPs via industrial WWTPs were higher than those found for domestic and industrial WWTPs. This indicates that phthalate emissions are associated with household activities, while NPP emissions are associated with industrial activities.

Authors: Lee YS, Lee S, Lim JE, Moon HB.

Full Source: Science of the Total Environment. 2019 Jul 19; 692:354-360. doi: 10.1016/j.scitotenv.2019.07.301. [Epub ahead of print]

Enantiomeric analysis of pyrethroids and organophosphorus insecticides

2019-09-02

The use of pesticides has increased sharply in the last decades, not only in agriculture, but also in industry, public health, and other areas. Pyrethroids and organophosphorus insecticides are among the most employed pesticides. These chemicals usually contain asymmetric chiral atoms; thus, they are characterised by stereoisomerism. Although most of these chiral pesticides are produced, used, and released as racemic mixtures, the different enantiomers of these compounds can present different insecticidal activity, different toxicity against vertebrates and invertebrates, and also different persistence in the environment. In fact, in some cases, only one enantiomer is active, while the other can be less active or even toxic to non-target organisms. Therefore, the development of enantioselective analytical methodologies enabling their determination presents a high interest. Different separation techniques, including high performance liquid chromatography, gas chromatography, supercritical fluid chromatography, and capillary electrophoresis, have been employed to achieve the chiral analysis of pyrethroids and organophosphorus insecticides. This review presents the characteristics of the stereoselective analytical methodologies developed with this aim from 2010 to April 2019 and their applications to the analysis of real samples as well as for toxicity and biodegradation studies.

Authors: Jiménez-Jiménez S, Casado N, García MÁ, Marina ML.

Full Source: Journal of Chromatography A. 2019 Jul 4:360345. doi: 10.1016/j.chroma.2019.06.066. [Epub ahead of print]

This review presents the characteristics of the stereoselective analytical methodologies developed with this aim from 2010 to April 2019 and their applications to the analysis of real samples as well as for toxicity and biodegradation studies.

Sustainability of safe foods: Joint environmental, economic and microbial load reduction assessment of antimicrobial systems in U.S. beef processing

2019-09-02

Various antimicrobial interventions are applied sequentially in the beef processing industry to reduce microbial load on beef products by using intensive inputs (e.g., chemicals, energy), high strength wastewater, and potentially result in meat discoloration. This study serves as the first analysis to jointly evaluate environmental and economic assessment with its microbial load reduction of proposed antimicrobial systems in the U.S. beef processing industry to identify relatively sustainable systems that minimise environmental and economic impacts while providing microbial safe meat. Specifically, forty potential sequential antimicrobial systems were proposed and evaluated from three perspectives: microbial load reduction, environmental, and economic impacts, by meta-analysis, life cycle assessment, and operational cost analysis orderly. The results show that the antimicrobial systems applying steam pasteurisation during the main intervention offer high microbial load reduction (>4.2 log CFU/cm² reduction from a hypothetical initial contamination at 5.0 log CFU/cm²). Human health impact (31.0 to 65.6%) and ecosystem toxicity (3.6 to 12.5%), eutrophication (11.9 to 15.5%) and global warming (6.4 to 22.2%) are the main contributors to the overall environmental single score among the forty antimicrobial systems. Antimicrobial chemicals (up to 82.8%), wastewater treatment (up to 12.7%), and natural gas (up to 10.7%) are the three major drivers of operational cost for sanitizing 1000 kg hot standard carcass weight (HSCW). Devalued (discoloured) meat due to contact with heat from steam pasteurisation or hot water wash has a considerable increase in economic (\$4.5/1000 HSCW) and environmental (especially at farm stage) impacts. Certain antimicrobial systems (e.g., water wash followed by steam pasteurisation) were found to be more promising with satisfactory effectiveness, better environmental and cost performance under uncertainty (1000 Monte Carlo simulations). Results from this study can guide the U.S. beef processing industry to advance sustainability while protecting human health from foodborne illness.

Authors: Li S, Zhilyaev S, Gallagher D, Subbiah J, Dvorak B.

Full Source: Science of the Total Environment. 2019 Jul 5; 691:252-262. doi: 10.1016/j.scitotenv.2019.07.064. [Epub ahead of print]

This study serves as the first analysis to jointly evaluate environmental and economic assessment with its microbial load reduction of proposed antimicrobial systems in the U.S. beef processing industry to identify relatively sustainable systems that minimise environmental and economic impacts while providing microbial safe meat.

MEDICAL RESEARCH

Proposed Key Characteristics of Female Reproductive Toxicants as an Approach for Organising and Evaluating Mechanistic Data in Hazard Assessment

2019-09-02

Identification of female reproductive toxicants is currently based largely on integrated epidemiological and in vivo toxicology data and, to a lesser degree, on mechanistic data. A uniform approach to systematically search, organise, integrate, and evaluate mechanistic evidence of female reproductive toxicity from various data types is lacking. In the present study, the authors sought to apply a key characteristics approach similar to that pioneered for carcinogen hazard identification to female reproductive toxicant hazard identification. A working group of international experts was convened to discuss mechanisms associated with chemical-induced female reproductive toxicity and identified 10 key characteristics of chemicals that cause female reproductive toxicity: 1) alters hormone receptor signalling; alters reproductive hormone production, secretion, or metabolism; 2) chemical or metabolite is genotoxic; 3) induces epigenetic alterations; 4) causes mitochondrial dysfunction; 5) induces oxidative stress; 6) alters immune function; 7) alters cell signal transduction; 8) alters direct cell–cell interactions; 9) alters survival, proliferation, cell death, or metabolic pathways; and 10) alters microtubules and associated structures. As proof of principle, cyclophosphamide and diethylstilbestrol (DES), for which both human and animal studies have demonstrated female reproductive toxicity, display at least 5 and 3 key characteristics, respectively. 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), for which the epidemiological evidence is mixed, exhibits 5 key characteristics. Future efforts should focus on evaluating the proposed key characteristics against additional known and suspected female reproductive toxicants. Chemicals that exhibit one or more of the key characteristics could be prioritised for additional evaluation and testing. A key characteristics approach has the potential to integrate with pathway-based toxicity testing to improve prediction of female reproductive toxicity in chemicals and potentially prevent some toxicants from entering common use.

Authors: Luderer U, Eskenazi B, Hauser R, Korach KS, McHale CM, Moran F, Rieswijk L, Solomon G, Udagawa O, Zhang L, Zlatnik M, Zeise L, Smith MT.
Full Source: Environmental Health Perspectives. 2019 Jul;127(7):75001. doi: 10.1289/EHP4971. Epub 2019 Jul 19.

In the present study, the authors sought to apply a key characteristics approach similar to that pioneered for carcinogen hazard identification to female reproductive toxicant hazard identification.

Diagnostic yield of the plasma free amino acid index for pancreatic cancer in patients with diabetes mellitus

2019-09-02

A multivariate index calculated using plasma free amino acids (PFAA index) was reported as a diagnostic biomarker for pancreatic cancer (PaC). Although diabetes mellitus (DM) is expected to be an early diagnostic indicator of PaC, identifying the high-risk individuals among patients with DM is warranted. The authors evaluated the diagnostic yield of the PFAA index for PaC in patients with DM. The diagnostic yield of the PFAA index was compared between individuals with and those without DM. Cases and controls were recruited prospectively, and controls were matched to cases at a 1:1 ratio for age, sex, and DM status. A total of 180 case-control pairs were included in the analysis. The prevalence of DM was 53.3%. The sensitivity of the PFAA index was 66.7% in cases with DM and 56.0% in those without DM ($P = 0.14$), and the specificity was 92.7% in controls with DM and 94.0% in those without DM ($P = 0.95$). This matched case-control study revealed a comparable diagnostic yield of the PFAA index for PaC in individuals with and those without DM. The PFAA index can be used as a biomarker for further diagnostic imaging in selected patients with DM.

Authors: Mizuno S, Isayama H, Nakai Y, Ishigaki K, Saito K, Sato T, Takeda T, Hakuta R, Saito T, Takahara N, Kogure H, Ijichi H, Tateishi K, Tada M, Shikata N, Tagami T, Kikuchi S, Yamamoto H, Yamakado M, Koike K.

Full Source *Pancreatology*. 2019 Jul;19(5):695-698. doi: 10.1016/j.pan.2019.07.002. Epub 2019 Jul 13.

Relationship of reduced glomerular filtration rate with alterations in plasma free amino acids and uric acid evaluated in healthy control and hypertensive subjects

2019-09-02

The potential association between altered levels of plasma free amino acids (PFAAs) and uric acid (UA) with estimated glomerular filtration rate (eGFR) remains unknown among patients with hypertension. A total of 2804 healthy controls and 2455 hypertensive patients were included in the current analysis. eGFR was defined as reduced when it was <60 ml/min/1.73 m². The associations between reduced eGFR and individual PFAAs and UA in the healthy control and hypertension groups were explored by logistic regression analyses adjusted for potential confounding variables. Results show that UA had a significant positive association with reduced eGFR in both healthy control and hypertension groups ($P < 0.001$). Among the PFAAs, citrulline, glycine and phenylalanine

The potential association between altered levels of plasma free amino acids (PFAAs) and uric acid (UA) with estimated glomerular filtration rate (eGFR) remains unknown among patients with hypertension.

showed significant positive associations with reduced eGFR in both healthy control ($P < 0.01$ to 0.001) and hypertension ($P < 0.001$) groups. Moreover, alanine, asparagine and methionine achieved significant positive associations with reduced eGFR only in the hypertension group ($P < 0.01$ to 0.001). Conversely, serine showed significant inverse associations with reduced eGFR in the hypertension group only ($P < 0.001$). These findings provide first evidence for a strong relationship between distinct patterns of PFAAs and elevated UA with reduced eGFR in hypertension. The findings may appear useful in developing effective strategies for the prevention or early detection and treatment of declined kidney function in hypertension.

Authors: Mahbub MH, Yamaguchi N, Takahashi H, Hase R, Yamamoto H, Kikuchi S, Tanabe T.

Full Source: Science Reports. 2019 Jul 16;9(1):10252. doi: 10.1038/s41598-019-46598-7.

The effect of acute glutamate treatment on the functional connectivity and network topology of cortical cultures

2019-09-02

Microelectrode arrays (MEAs) allow the investigation of the pharmacological and toxicological effects of chemicals on cultured neuronal networks. Understanding the functional connections between neurons and the resulting neuronal networks is important for evaluating drugs that affect synaptic transmission. Therefore, the authors acutely treated a mature cultured neuronal network on MEAs with accumulating amounts of glutamate and recorded their altered electrophysiology. Subsequently, a cross-covariance analysis was applied to process the spiking activity in the network and to evaluate the connections between neurons. Finally, graph theory was used to assess the functional network properties under acute glutamate treatment. The data demonstrated that glutamate increased the similarity, connectivity weight, density, and largest-component size of the functional network. In addition, the small-world network topology was altered after glutamate treatment. The results indicate that the graph theory can advance our understanding of the pharmacological significance of neurotransmitters on neuronal networks.

Authors: Han Y, Zhu H, Zhao Y, Lang Y, Sun H, Han J, Wang L, Wang C, Zhou J.

Full Source: Medical Engineering & Physics. 2019 Jul 13. pii: S1350-4533(19)30135-3. doi: 10.1016/j.medengphy.2019.07.007. [Epub ahead of print]

The authors acutely treated a mature cultured neuronal network on MEAs with accumulating amounts of glutamate and recorded their altered electrophysiology.

Pesticide interactions and risks of sperm chromosomal abnormalities.

2019-09-02

Disentangling the separate and synergistic effects of chemicals poses methodological challenges for accurate exposure assessment and for investigating epidemiologically how chemicals affect reproduction. In this study, the authors investigated combined exposures to ubiquitous contemporary use pesticides, specifically organophosphates (OP) and pyrethroids (PYR), and their association with germ cell abnormalities among adult men. Fluorescence in situ hybridisation was used to determine disomy in sperm nuclei and urine was analysed for concentrations of PYR metabolites (3-phenoxybenzoic acid; 3PBA) and OP dialkyl phosphate (DAP) metabolites. Incidence rate ratios using Poisson models were estimated for each disomy type by exposure quartile of DAP metabolites and 3PBA, controlling for confounders. The shape of the associations between PYRs, OPs and disomy were frequently nonmonotonic. There were consistent interactions between OP and PYR metabolite concentrations and the risk for sperm abnormalities. Taking both chemicals into account simultaneously resulted in quantitatively different associations than what was reported previously for OPs and PYRs separately, demonstrating the importance of modelling multiple concentrations simultaneously. Methods investigating interactions using Poisson models are needed to better quantify chemical interactions and their effects on count-based health outcomes, the importance of which was shown here for germ cell abnormalities.

Authors: Figueroa ZI, Young HA, Mumford SL, Meeker JD, Barr DB, Gray GM, Perry MJ.

Full Source: International Journal of Hygiene & Environmental Health. 2019 Aug;222(7):1021-1029. doi: 10.1016/j.ijheh.2019.07.001. Epub 2019 Jul 13.

In this study, the authors investigated combined exposures to ubiquitous contemporary use pesticides, specifically organophosphates (OP) and pyrethroids (PYR), and their association with germ cell abnormalities among adult men.

OCCUPATIONAL RESEARCH

Biological and environmental exposure monitoring of volatile organic compounds among nail technicians in the Greater Boston area

2019-09-02

Nail technicians are exposed to volatile organic compounds (VOCs) from nail products, but no studies have previously measured VOC biomarkers for these workers. This study of 10 nail technicians aimed to identify VOCs in nail salons and explore relationships between air concentrations

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and biomarkers. Personal and area air samples were collected using thermal desorption tubes during a work shift and analysed using gas chromatography/mass spectrometry (GC/MS) for 71 VOCs. Whole blood samples were collected pre-shift and post-shift, and analysed using GC/MS for 43 VOCs. Ventilation rates were determined using continuous CO₂ measurements. Predominant air VOC levels were ethyl methacrylate (median 240 µg/m³), methyl methacrylate (median 205 µg/m³), toluene (median 100 µg/m³), and ethyl acetate (median 639 µg/m³). Blood levels were significantly higher post-shift than pre-shift for toluene (median pre-shift 0.158 µg/L and post-shift 0.360 µg/L) and ethyl acetate (median pre-shift <0.158 µg/L and post-shift 0.510 µg/L); methacrylates were not measured in blood because of their instability. Based on VOCs measured in these seven nail salons, the authors estimated that emissions from Greater Boston area nail salons may contribute to ambient VOCs. Ventilation rates did not always meet the ASHRAE guideline for nail salons. There is a need for changes in nail product formulation and better ventilation to reduce VOC occupational exposures.

Authors: Ceballos DM, Craig J, Fu X, Jia C, Chambers D, Chu MT, Fernandez AT, Fruh V, Petropoulos ZE, Allen JG, Vallarino J, Thornburg L, Webster TF. Full Source: *Indoor Air*. 2019 Jul;29(4):539-550. doi: 10.1111/ina.12564. Epub 2019 May 21.

Priority: safe working conditions

2019-09-02

The drawing up of a new regulation of the Minister of Family, Labour and Social Policy regarding the maximum admissible concentrations and intensities of agents harmful to health in the working environment resulted from the obligatory implementation into national law the provisions of Commission Directive (EU) 2017/164 of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC, and amending Commission Directives 91/322/EEC, 2000/39/EC and 2009/161/EU, the provisions of which Member States had to introduce by 21 August 2018, and partly Directive 2017/2398/EU of the European Parliament and of the Council of 12 December 2017 amending Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work. The Regulation takes into account 13 applications submitted in the years 2014-2017 by the Interdepartmental Commission for Maximum Admissible Concentrations and Intensities for Agents Harmful to Health in the Working Environment to the minister competent for labour issues. The Commission was appointed by way of the regulation of the Prime

The drawing up of a new regulation of the Minister of Family, Labour and Social Policy regarding the maximum admissible concentrations and intensities of agents harmful to health in the working environment resulted from the obligatory implementation into national law the provisions of Commission Directive (EU) 2017/164 of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC, and amending Commission Directives 91/322/EEC, 2000/39/EC and 2009/161/EU, the provisions of which Member States had to introduce by 21 August 2018, and partly Directive 2017/2398/EU

Minister of 15 December 2008 (Journal of Laws 2015, item 1772, as amended), and its tasks include submitting to the minister competent for labour issues applications regarding the value of the maximum admissible concentrations and intensities for agents harmful to health in the working environment.

Author: Skowroń J.

Full Source: *Medycyna Pracy*. 2019 Jul 16;70(4):497-509. doi: 10.13075/mp.5893.00832. Epub 2019 Jun 11.

Health risk in transport workers. Part II. Dietary compounds as modulators of occupational exposure to chemicals

2019-09-02

Professional drivers are exposed to a number of factors that have a negative influence on their health status. These include vibrations, noise, the lack of fresh air in the car cabin, shift work (frequently at night), monotony resulting from permanent repetition of certain actions, static loads due to immobilisation in a sitting position, stress resulting from the need to ensure safety in heavy traffic, as well as air pollution (dust, volatile organic substances, nitrogen and sulfur oxides, polycyclic aromatic hydrocarbons, heavy metals, dioxins, furans and others). Factors associated with the specificity of the profession of a driver, including exposure to chemical substances, result in an increased risk of the development of many diseases, i.e., obesity, diabetes, heart disease, hypertension, extensive genitourinary pathology experienced by taxi drivers, lung cancer and other forms of cancer. In the case of drivers, especially those covering long distances, there are also actual difficulties related to ensuring a proper diet. Although attempts at interventional research that would change the principles of nutrition, as well as ensure physical activity and weight reduction, have been made, their results have not been satisfactory. The paper focuses on the discussion on the role of a diet and dietary phytochemicals in the prevention of adverse health effects of such chemicals as a mix of chemicals in the polluted air, benzo(a)pyrene, benzene and metals (lead, cadmium, chromium, nickel), which are the main sources of exposure in the case of transport workers.

Authors: Kozłowska L, Gromadzińska J, Wąsowicz W.

Full Source: *International Journal of Occupational Medicine & Environmental Health*. 2019 Jul 15;32(4):441-464. doi: 10.13075/ijom.1896.01434. Epub 2019 May 8.

Professional drivers are exposed to a number of factors that have a negative influence on their health status.

Serum cholesterol levels preceding to suicide death in Japanese workers: A nested case-control study

2019-09-02

In this study, the authors investigated the association between suicide death and serum cholesterol levels as measured at times close to suicide death. A nested case-control study was conducted of 41 cases of suicide deaths and 205 matched controls with serum total cholesterol (TC) levels till three years before suicide death in a large cohort of Japanese workers. Individuals in the lowest vs. highest tertile/predefined category of TC in a Japanese working population had a three- to four-fold greater risk of suicide death. Each 10 mg/dL decrement of average TC was associated with an 18% increased chance of suicide death (95% confidence interval, 2-35%). Similar results were found for TC levels at each year. These results suggest that a low serum TC level in recent past is associated with an increased risk of suicide death.

Authors: Chen S, Mizoue T, Hu H, Kuwahara K, Honda T, Yamamoto S, Nakagawa T, Miyamoto T, Okazaki H, Shimizu M, Murakami T, Eguchi M, Kochi T, Yamamoto M, Ogasawara T, Sasaki N, Uehara A, Imai T, Nishihara A, Hori A, Nagahama S, Tomita K, Konishi M, Kabe I, Dohi S; Japan Epidemiology Collaboration on Occupational Health Study Group.
Full Source: *Acta Neuropsychiatry*. 2019 Jul 1:1-13. doi: 10.1017/neu.2019.26. [Epub ahead of print]

Semi-quantitative health risk assessment of exposure to chemicals in an aluminium rolling mill

2019-09-02

The main goal of this study was to evaluate the health risks resulting from occupational exposure to chemicals in an aluminium rolling mill to propose effective control measures. Exposure of workers to chemicals was assessed based on the Singapore Health Department's methodology. The health risks of exposure to the identified chemicals and the relative risk of developing cancer due to exposure to benzene were assessed. According to the results, the risk level of exposure to sulfuric acid in the washing line and to manganese in the manufacturing unit were high. In assessing the risk of developing cancer arising from benzene exposure, the lifetime cancer risk was found in the range 10^{-4} - 10^{-6} (the possible range). The results indicated that in the aluminium rolling industry, occupational

In this study, the authors investigated the association between suicide death and serum cholesterol levels as measured at times close to suicide death.

exposure to 75% of the chemicals had a low risk level, 15% had a moderate risk level and 10% had a high-risk level.

Authors: Sanjari A, Saeedi R, Khaloo SS.

Full Source: International Journal of Occupational Safety and Ergonomics. 2019 Jul 24:1-8. doi: 10.1080/10803548.2019.1617459. [Epub ahead of print]

PUBLIC HEALTH RESEARCH

A curated knowledgebase on endocrine disrupting chemicals and their biological systems-level perturbations

2019-09-02

Human well-being can be affected by exposure to several chemicals in the environment. One such group is endocrine disrupting chemicals (EDCs) that can perturb the hormonal homeostasis leading to adverse health effects. In this study, the authors have developed a detailed workflow to identify EDCs with supporting evidence of endocrine disruption in published experiments in humans or rodents. Thereafter, this workflow was used to manually evaluate more than 16,000 published research articles and identify 686 potential EDCs with published evidence in humans or rodents. Importantly, the authors have compiled the observed adverse effects or endocrine-specific perturbations along with the dosage information for the potential EDCs from their supporting published experiments. Subsequently, the potential EDCs were classified based on the type of supporting evidence, their environmental source and their chemical properties. Additional compiled information for potential EDCs include their chemical structure, physicochemical properties, predicted ADMET properties and target genes. In order to enable future research based on this compiled information on potential EDCs, an online knowledgebase, Database of Endocrine Disrupting Chemicals and their Toxicity profiles (DEDuCT) was built, accessible at: <https://cb.imsc.res.in/deduct/>. After building this comprehensive resource, we have performed a network-centric analysis of the chemical space and the associated biological space of target genes of EDCs. Specifically, two networks of EDCs were constructed using resource based on similarity of chemical structures or target genes. Ensuing analysis revealed a lack of correlation between chemical structure and target genes of EDCs. Though our detailed results highlight potential challenges in developing predictive models for EDCs, the compiled information in the authors resource will undoubtedly enable future research in the field, especially, those focussed

In this study, the authors have developed a detailed workflow to identify EDCs with supporting evidence of endocrine disruption in published experiments in humans or rodents.

towards mechanistic understanding of the systems-level perturbations caused by EDCs.

Authors: Karthikeyan BS, Ravichandran J, Mohanraj K, Vivek-Ananth RP, Samal A.

Full Source: Science of the Total Environment. 2019 Jul 16; 692:281-296. doi: 10.1016/j.scitotenv.2019.07.225. [Epub ahead of print]

Toxicity classification of e-cigarette flavouring compounds based on European Union regulation: analysis of findings from a recent study

2019-09-02

A recent study raised concerns about e-cigarette liquids toxicity by reporting the presence of 14 flavouring chemicals with toxicity classification. However, the relevant toxicity classification was not estimated according to the measured concentrations. The purpose of this study was to calculate the toxicity classification for different health hazards for all the flavouring chemicals at the maximum concentrations reported. The analysis was based on the European Union Classification Labelling and Packaging regulation. The concentration of each flavouring chemical was compared with the minimum concentration needed to classify it as toxic. Additionally, toxicity classification was examined for a theoretical e-cigarette liquid containing all flavouring chemicals at the maximum concentrations reported. There was at least one toxicity classification for all the flavouring chemicals, with the most prevalent classifications related to skin, oral, eye and respiratory toxicities. One chemical (methyl cyclopentenolone) was found at a maximum concentration 150.7% higher than that needed to be classified as toxic. For the rest, the maximum reported concentrations were 71.6 to > 99.9% lower than toxicity concentrations. A liquid containing all flavouring compounds at the maximum concentrations would be classified as toxic for one category only due to the presence of methyl cyclopentenolone; a liquid without methyl cyclopentenolone would have 66.7 to > 99.9% lower concentrations of flavourings than those needed to be classified as toxic. The vast majority of flavouring compounds in e-cigarette liquids as reported in a recent study were present at levels far lower than needed to classify them as toxic. Since exceptions exist, regulatory monitoring of liquid composition is warranted.

Authors: Farsalinos K, Lagoumintzis G.

Full Source: Harm Reduction Journal. 2019 Jul 25;16(1):48. doi: 10.1186/s12954-019-0318-2.

The purpose of this study was to calculate the toxicity classification for different health hazards for all the flavouring chemicals at the maximum concentrations reported.

Assessing human vulnerability in industrial chemical accidents: a qualitative and quantitative methodological approach

2019-09-02

Iran as a developing country is experiencing the industrialisation process quickly and is thus exposed to different industrial hazards mostly derived from chemicals. In the light of this problem, this study estimated the human vulnerability in chemical accidents using the software simulation of accidental chlorine gas releases. A mixed method (qualitative and quantitative) study carried out in 4 phases during 2015-2017 in Ray County, Tehran Province. It included a systematic literature review, software simulation, Fuzzy Delphi Analytical Hierarchy Process (FDAHP) hierarchy process study, and creating a reliable tool for purpose of this study in at-risk areas. The valuable finding indicated that decreasing the human vulnerability depends on both social and physical characteristics of area and even the social vulnerability indicators have more important role when compared with the physical vulnerability indicators. The statistical analysis revealed that the human vulnerability has the significant relationship with factors such as type of living place (rural or urban) areas, nationality, economic situation of households, the distance between housing and the nearest exit to main road, health centres, and manufacturing or storing chemical plants (P value < 0.01). The result also showed that the area under study is vulnerable from average to very high, both in its physical and social domains, against industrial chemical accidents. Additional comparative studies are needed to develop and generalise the appropriate set of indicators of human vulnerability to human induced disasters in Iran.

Authors: Ardalan A, Fatemi F, Aguirre B, Mansouri N, Mohammdfam I.

Full Source: Environmental Monitoring & Assessment. 2019 Jul

24;191(8):506. doi: 10.1007/s10661-019-7662-2.

This study estimated the human vulnerability in chemical accidents using the software simulation of accidental chlorine gas releases.

Integrated in silico and in vitro genotoxicity assessment of thirteen data-poor substances

2019-09-02

The Canadian Domestic Substances List (DSL) contains chemicals that have not been tested for genotoxicity as their use pre-dates regulatory requirements. In the present study, (quantitative) structure-activity relationships ((Q)SAR) model predictions and in vitro tests were conducted for genotoxicity assessment of 13 data-poor chemicals from the DSL (i.e. CAS numbers 19286-75-0, 13676-91-0, 2478-20-8, 6408-20-8, 74499-36-8,

26694-69-9, 29036-02-0, 120-24-1, 84696-48-9, 4051-63-2, 5718-26-3, 632-51-9, and 600-14-6). First, chemicals were screened by (Q)SAR models in Leadscape® and OASIS TIMES; two chemicals were excluded from (Q)SAR as they are complex mixtures. Six were flagged by (Q)SAR as potentially mutagenic and were subsequently confirmed as mutagens using the Ames assay. Of nine chemicals with clastogenic (Q)SAR flags, eight induced micronuclei in TK6 cells. Benchmark dose analysis was used to evaluate the potency of the chemicals. Four chemicals were bacterial mutagens with similar potencies. Three chemicals were more potent in micronuclei induction than the prototype alkylating agent methyl methanesulfonate and three were equipotent to the mutagenic carcinogen benzo[a]pyrene in the presence of rat liver S9. Overall, 11 of the 13 DSL chemicals demonstrated at least one type of genotoxicity in vitro. This study demonstrates the application of genotoxic potency analysis for prioritising further investigations.

Authors: Tran YK, Buick JK, Keir JLA, Williams A, Swartz CD, Recio L, White PA, Lambert IB, Yauk CL.

Full Source: Regulatory Toxicology & Pharmacology. 2019 Jul 20; 107:104427. doi: 10.1016/j.yrtph.2019.104427. [Epub ahead of print]

Study Design, Rationale and Procedures for Human Biomonitoring of Hazardous Chemicals from Foods and Cooking in Korea

2019-09-02

A nationwide biomonitoring program identified the long-term trends of environmental exposures to hazardous chemicals in the general population and found geographical locations where body burdens of an exposed group significantly differed from those of the general population. The purpose of this study is to analyse the hazardous compounds associated with foods and cooking in the nationwide general population for evaluation of the environmental exposures and health risk factors and for the establishment of the reference levels at the national level. During 2009-2010, the National Institute of Food and Drug Safety Evaluation (NIFDS) conducted a nationwide human biomonitoring study, including a questionnaire survey and environmental exposure assessments for specific hazardous compounds from foods and cooking among the general population in South Korea. Results: A total of 2139 individuals voluntarily participated in 98 survey units in South Korea, including 889 (41.6%) men and 1250 women (58.4%). Bio-specimens (serum and urine) and questionnaires were collected from the study population. Acrylamides, heterocyclic amines (HCAs), phenols, and phthalates were analysed

The purpose of this study is to analyse the hazardous compounds associated with foods and cooking in the Korean general population for evaluation of the environmental exposures and health risk factors and for the establishment of the reference levels at the national level.

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from urine, and perfluorinated compounds (PFCs) and organic chloride pesticides (OCPs) were analysed from serum samples. The information on exposure pathway and geographical locations for all participants was collected by questionnaire interviews, which included demographic characteristics, socioeconomic status, history of family diseases, conditions of the indoor and outdoor environment, lifestyles, occupational history, and food and dietary information. The authors describe the design of the study and sampling of human biospecimen procedures including bio-sample repository systems. The resources produced from this nationwide human biomonitoring study and survey will be valuable for use in future biomarkers studies and for the assessment of exposure to hazardous compounds associated with foods and cooking.

Authors: Lee S, Ahn RM, Kim JH, Han YD, Lee JH, Son BS, Lee K.

Full Source: International Journal of Environmental Research & Public Health. 2019 Jul 19;16(14). pii: E2583. doi: 10.3390/ijerph16142583.