บทความที่น่าสนใจประจำเดือนพฤษภาคม 2559

สาขาวิทยาศาสตร์และเทคโนโลยี

1	Title:	Identification of transformation products of antiviral drugs formed during biological wastewater treatment and their occurrence in the urban water cycle
	Author:	Jan Funke, Carsten Prasse, Thomas A. Ternes
	Journal:	Water Research, Volume 98, 1 July 2016, Pages 75–83
	Abstract:	The fate of five antiviral drugs (abacavir, emtricitabine, ganciclovir, lamivudine and zidovudine) was investigated in biological wastewater treatment. Investigations of degradation kinetics were accompanied by the elucidation of formed transformation products (TPs) using activated sludge lab experiments and subsequent LC-HRMS analysis. Degradation rate constants ranged between 0.46 L d−1 gSS−1 (zidovudine) and 55.8 L d−1 gSS−1 (abacavir). Despite these differences of the degradation kinetics, the same main biotransformation reaction was observed for all five compounds: oxidation of the terminal hydroxyl-moiety to the corresponding carboxylic acid (formation of carboxy-TPs). In addition, the oxidation of thioether moieties to sulfoxides was observed for emtricitabine and lamivudine. Antiviral drugs were detected in influents of municipal wastewater treatment plants (WWTPs) with concentrations up to 980 ng L−1 (emtricitabine), while in WWTP effluents mainly the TPs were found with concentration levels up to 1320 ng L−1 (carboxy-abacavir). Except of zidovudine none of the original antiviral drugs were detected in German rivers and streams, whereas the concentrations of the TPs ranged from 16 ng L−1 for carboxy-lamivudine up to 750 ng L−1 for carboxy-acyclovir. These concentrations indicate an appreciable portion from WWTP effluents present in rivers and streams, as well as the high environmental persistence of the carboxy-TPs. As a result three of the carboxylic TPs were detected in finished drinking water.
	Database:	ScienceDirect

2	Title:	Vulnerability of drinking water supplies to engineered nanoparticles
	Author:	Martin Troester, Heinz-Juergen Brauch, Thilo Hofmann
	Journal:	Water Research, Volume 96, 1 June 2016, Pages 255–279
	Abstract:	The production and use of engineered nanoparticles (ENPs) inevitably leads to their release into aquatic environments, with the quantities involved expected to increase significantly in the future. Concerns therefore arise over the possibility that ENPs might pose a threat to drinking water supplies. Investigations into the vulnerability of drinking water supplies to ENPs are hampered by the absence of suitable analytical methods that are capable of detecting and quantifiying ENPs in complex aqueous matrices. Analytical data concerning the presence of ENPs in drinking water supplies is therefore

	scarce. The eventual fate of ENPs in the natural environment and in processes that are important for drinking water production are currently being investigated through laboratory based-experiments and modelling. Although the information obtained from these studies may not, as yet, be sufficient to allow comprehensive assessment of the complete life-cycle of ENPs, it does provide a valuable starting point for predicting the significance of ENPs to drinking water supplies. This review therefore addresses the vulnerability of drinking water supplies to ENPs. The risk of ENPs entering drinking water is discussed and predicted for drinking water produced from groundwater and from surface water. Our evaluation is based on reviewing published data concerning ENP production amounts and release patterns, the occurrence and behavior of ENPs in aquatic systems relevant for drinking water supply and ENP removability in drinking water purification processes. Quantitative predictions are made based on realistic high-input case scenarios. The results of our synthesis of current knowledge suggest that the risk probability of ENPs being present in surface water resources is generally limited, but that particular local conditions may increase the probability of raw water contamination by ENPs. Drinking water extracted from porous media aquifers are not generally considered to be prone to ENP contamination. In karstic aquifers, however, there is an increased probability that if any ENPs enter the groundwater system they will reach the extraction point of a drinking water treatment plant (DWTP). The ability to remove ENPs during water treatment depends on the specific design of the treatment process. In conventional DWTPs with no flocculation step a proportion of ENPs, if present in the raw water, may reach the final drinking water. The use of ultrafiltration techniques improves drinking water safety with respect to ENP contamination.
Database:	ScienceDirect

3	Title:	More value from food waste: Lactic acid and biogas recovery
	Author:	Mi-Sun Kim, Jeong-Geol Na, Mo-Kwon Lee, Hoyoung Ryu, Yong-Keun Chang, Jin M. Triolo, Yeo-Myeong Yun, Dong-Hoon Kim
	Journal:	Water Research, Volume 96, 1 June 2016, Pages 208–216
	Abstract:	Anaerobic digestion (AD) is one of the traditional technologies for treating organic solid wastes, but its economic benefit is sometimes questioned. To increase the economic feasibility of the treatment process, the aim of this study was to recover not only biogas from food waste but lactic acid (LA) as well. At first, LA fermentation of food waste (FW) was conducted using an indigenous mixed culture. During the operation, temperature was gradually increased from 35 °C to 55 °C, with the highest performance attained at 50 °C. At 50 °C and hydraulic retention time (HRT) of 1.0 d, LA concentration in the broth was 40 kg LA/m3, corresponding to a yield of 1.6 mol LA/mol hexoseadded.

		Pyrosequencing results showed that Lactobacillus (97.6% of the total number of sequences) was the predominant species performing LA fermentation of FW. The fermented broth was then centrifuged and LA was extracted from the supernatant by the combined process of nanofiltration and water-splitting electrodialysis. The process could recover highly purified LA by removing 85% of mineral ions such as Na+, K+, Mg2+, and Ca2+ and 90% of residual carbohydrates. Meanwhile, the solid residue remained after centrifugation was further fermented to biogas by AD. At HRT 40 d (organic loading rate of 7 kg COD/m3/d), the highest volumetric biogas production rate of 3.5 m3/m3/d was achieved with a CH4 yield of 0.25 m3 CH4/kg COD. The mass flow showed that 47 kg of LA and 54 m3 of biogas could be recovered by the developed process from 1 ton of FW with COD removal efficiency of 70%. These products have a higher economic value 60 USD/ton FW compared to that of conventional AD (27 USD/ton FW).
	Database:	ScienceDirect

4	Title:	River-to-sea pressure retarded osmosis: Resource utilization in a full-scale facility
	Author:	Galen O'Toole, Lori Jones, Chris Coutinho, Corey Hayes, Monica Napoles, Andrea Achilli
	Journal:	Desalination, Volume 389, 1 July 2016, Pages 39–51
	Abstract:	Pressure retarded osmosis (PRO) is a technology that could be utilized to recover energy from the mixing of freshwater with seawater. This source of renewable energy is sizeable and in the past decade several investigations analyzed its potential. The vast majority of studies focused on mass transfer problems across the membrane in order to improve membrane productivity and just recently studies started to look at membrane module efficiencies and parasitic loads within the PRO facility. In this article, the net specific energy production from a facility-scale PRO system was determined and optimized by using a novel simulation method that integrates parasitic loads and efficiencies of the PRO facility components and combines the model with an optimization software in a linked system optimization scheme. It was found that the overall net specific energy that may be recovered by a river-to-sea PRO facility is approximately 0.12 kWh per m3 of permeate. Furthermore, a sensitivity analysis was performed to elucidate the relationship between net specific energy and power density as functions of membrane area, flow rates, and operating pressures. In general, in order to maximize resource recovery, a low power density, thus a low membrane productivity, must be accepted.
	Database:	ScienceDirect

5	Title:	Computational study of desalination by reverse osmosis — Three-dimensional analyses
	Author:	Ali E. Anqi, Nawaf Alkhamis, Alparslan Oztekin
	Journal:	Desalination, Volume 388, 15 June 2016, Pages 38–49

Abstract:	A computational study has been conducted to examine three-dimensional steady multicomponent fluid flows in the reverse osmosis membrane module. The module contains a net of spacers. The SST k-ω turbulence model is employed to simulate flow and concentration fields at Re = 400 and 800, while the laminar model is employed to characterize flow and concentration fields at Re = 100. Spacer grids with 30°, 45° and 60° are considered as three different geometries. The membrane is treated as a functional surface where water flux, concentration and local pressure are coupled. The nature of concentration polarization in each membrane module is determined. Characteristics of potential fouling buildup are determined from the wall shear stress distribution. Correlations between potential fouling regions and the concentration distribution are presented. The coefficient of performance for each membrane module is determined at all flow rates considered. It has been illustrated that all membrane modules perform better at higher flow rates. The membrane module containing the net of spacers in the 30° arrangement is shown to be the most efficient membrane module. This study proves that the configuration of spacers is an important optimization parameter for the design of reverse osmosis membrane modules.
Database:	ScienceDirect

6	Title:	The effects of design parameters on productivity performance of a solar still for seawater desalination: A review
	Author:	Mohammed Shadi S. Abujazar, S. Fatihah, A.R. Rakmi, M.Z. Shahrom
	Journal:	Desalination, Volume 385, 2 May 2016, Pages 178–193
	Abstract:	This paper aims to investigate the different parameters that affect solar still productivity when the solar still productivity is very low compared with other desalination systems, such as other thermal processes or membrane processes. These parameters include environmental, design and operational parameters. The results show that productivity was highly affected by environmental parameters due to the unpredictability of metrological factors. When design and operational parameters were varied, increases in productivity were observed. The results indicated that the solar still was inversely affected by evaporation area, water depth, a minimization in the angle of the solar still cover during summer seasons and maximization during winter seasons. Stepped solar still techniques enhanced the productivity, and the addition of wicks in a stepped solar still was proposed. Insulating the sun tracking system positively affected the productivity because the insulation increased the heating capability and evaporative effects inside the still basin.
	Database:	ScienceDirect

7	Title:	Influence of diet, vitamin, tea, trace elements and exogenous antioxidants on arsenic metabolism and toxicity
	Author:	Haiyan Yu, Su Liu, Mei Li, Bing Wu
	Journal:	Environmental Geochemistry and Health, April 2016, Volume 38, Issue 2, pp 339-351
	Abstract:	Health risk of arsenic (As) has received increasing attention. Acute and chronic exposure to As could cause several detrimental effects on human health. As toxicity is closely related to its bioaccessibility and metabolism. In real environment, many factors, such as diet and nutrition, can influence As bioaccessibility, metabolism and toxicity. This paper mainly reviews the influences of diets and elements on As bioaccessibility, metabolism and toxicity and their underlying mechanisms to provide suggestions for future investigations. Vitamins, jaggery, fruit, tea, glutathione, N-acetylcysteine and zinc could reduce the As-induced toxicity by increasing antioxidative enzymes to antagonize oxidative stress caused by As and/or increasing As methylation. However, bean and betel nut could increase risk of skin lesions caused by As. Interestingly, high-fat diet, selenium and iron have incompatible effects on As bioaccessibility, metabolism and toxicity in different experimental conditions. Based on current literatures, the As methylation and As-induced oxidative damage might be two main ways that the diets and elements influence As toxicity. Combined application of in vitro human cell lines and gastrointestinal models might be useful tools to simultaneously characterize the changes in As bioaccessibility and toxicity in the future research.
	Database:	SpringerLink

8	Title:	Chemically modified biochar produced from conocarpus waste increases NO3 removal from aqueous solutions
	Author:	Adel R. A. Usman, Mahtab Ahmad, Mohamed El-Mahrouky, Abdulrasoul Al-Omran, Yong Sik Ok, Abdelazeem Sh. Sallam, Ahmed H. El-Naggar, Mohammad I. Al-Wabel
	Journal:	Environmental Geochemistry and Health, April 2016, Volume 38, Issue 2, pp 511-521
	Abstract:	Biochar has emerged as a universal sorbent for the removal of contaminants from water and soil. However, its efficiency is lower than that of commercially available sorbents. Engineering biochar by chemical modification may improve its sorption efficiency. In this study, conocarpus green waste was chemically modified with magnesium and iron oxides and then subjected to thermal pyrolysis to produce biochar. These chemically modified biochars were tested for NO3 removal efficiency from aqueous solutions in batch sorption isothermal and kinetic experiments. The results revealed that MgO-biochar outperformed other biochars with a maximum NO3 sorption capacity of 45.36 mmol kg−1 predicted by the Langmuir sorption model. The kinetics data were well described by the Type 1 pseudo-second-order model, indicating chemisorption as the dominating mechanism of NO3 sorption onto biochars. Greater efficiency of MgO-biochar was related to its high specific surface area (391.8

	m2 g−1) and formation of strong ionic complexes with NO3. At an initial pH of 2, more than 89 % NO3 removal efficiency was observed for all of the biochars. We conclude that chemical modification can alter the surface chemistry of biochar, thereby leading to enhanced sorption capacity compared with simple biochar.
Database:	SpringerLink

9	Title:	Eco-hydraulic modelling of the interactions between hydropeaking and river morphology
	Author:	Davide Vanzo, Guido Zolezzi and Annunziato Siviglia
	Journal:	Ecohydrology, Volume 9, Issue 3, pages 421–437, April 2016
	Abstract:	Hydropeaking related to hydropower operations produces adverse ecological effects that depend on its interaction with the channel morphology. A first quantitative attempt is proposed to investigate the eco-hydraulic response of different river morphologies to hydropeaking waves based on a two-dimensional hydraulic modelling approach. Physical habitat diversity, macroinvertebrate drift and fish stranding, all relevant for hydropeaking, are quantitatively investigated with reference to realistic hydro-morphological conditions of regulated alpine streams. Habitat diversity and fish stranding have the strongest dependence on channel morphology and show nearly opposite behaviours with increasing morphological complexity. Braided reaches are the most resilient to hydropeaking offering the highest habitat diversity and very limited base-to-peak variation of macroinvertebrate drift, while alternate bars are extremely sensitive environments to drift and offer safer regions from stranding. Transitional morphologies between single-thread and multi-thread offer the best eco-hydraulic trade-offs. The method allows quantifying to which extent same eco-hydraulic targets can be achieved by either morphological restorations or base flow increases: in transitional morphologies, identical reduction in reach-averaged stranding risk might be obtained either by halving the channel width or by a threefold base flow increase; analogously, the same improvement in macroinvertebrate-fed areas can be achieved in a channel with alternating bars either by a threefold base flow increase or by increasing 2.5 times the channel width. Such quantification of the eco-hydraulic effectiveness of complementary management strategies offers a powerful tool to support design of restoration measures in hydropeaking rivers.
	Database:	Wiley Online Library

10	Title:	The temporal variation of indoor pollutants in photocopying shop
	Author:	Jelena S. Kiurski , Ivana B. Oros, Vesna S. Kecic, Ilija M. Kovacevic, Snezana M. Aksentijevic
	Journal:	Stochastic Environmental Research and Risk Assessment, April 2016, Volume 30, Issue 4, pp 1289-1300

Abstract:	The paper includes the identification of the main factors responsible for the temporal variations of indoor pollutants during three daily intervals in a photocopying shop. The measurements of concentration levels of total volatile organic compounds, ozone, carbon monoxide, carbon dioxide, nitrogen dioxide, ammonia, perchloroethylene and non-methane hydrocarbons were performed. The individual concentrations of target pollutants were subjected to principal component analysis (PCA) using a software XLSTAT 2014.1.10. Pearson correlation model indicated the relatively weak correlation between the investigated pollutants in a photocopying environment. PCA extracted three principal components (PCs) from the indoor air pollution data set. Obtained PCs explained 56.72 % of the total variance. The summarized biplots showed which pollutants are responsible for photocopying indoor pollution per sampling day/sampling point/time interval/number of measurement. The results pointed out that the main PCs were related to the usage of toners, electrostatic discharge, heating of photocopiers as well as general intensifying of photocopying processes.
Database:	SpringerLink