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Table of Contents

A Few Words from Editor

Dear SCCAEPA Online Journal Readers:

In this issue of the Southern California Chinese American Environmental Protection Association (SCCAEPA) Online Journal (ISSN 1944-8945), we published again the Proceedings from 2013 International Environmental Conference and Workshops, held in August 2013 in San Gabriel, California, U.S.A. and co-hosted with our sister Overseas Chinese Environmental Engineers and Scientists Association (OCEESA). We hope that the re-published Proceedings will be a prelude for coming 2014 SCCAEPA International Symposium.

In addition, we continue the column of "Lost in Translation" in this issue for readers who might be interested in language translation since this journal does accept both English and Chinese papers. From time to time, we all face the challenge how to translate the language which we think we understand well into the other language. Please join me to comment on those translations and write to us what you think the phrases should be translated. You are also encouraged to contribute your example of sentences. This is for your leisure reading.

To sustain the journal, we need members' contributions. I invite you to submit your work and written materials from your experience. To make things easier, I would like to suggest short articles that can be modified from your conference presentations and slides. The Journal is also open to outside of our association.

Enjoy!

Sincerely,

Yue Rong, Ph.D.
Editor-in-Chief
SCCAEPA Online Journal
November 2013
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Disclaimer

The company names and any trade names of a product mentioned in the articles of this journal do not reflect the endorsement of the Southern California Chinese American Environmental Protection Association (SCCAEPA).

Proceedings

2013 International Environmental Conference & Workshops

A joint conference of
6th Symposium on Global Emerging Environmental Challenges and
Government Responses
and
1st Symposium on Sustainable Environmental Science and Engineering

2013年國際環保大會及研討會
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第一屆永續環境科學與工程
聯席會議

會 刊

Los Angeles, USA

August 8-15, 2013

Abstract

Nitrogen removal from nitrate-laden wastewater by integrated vertical-flow constructed wetland systems

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Abstract: Nitrogen removals from nitrate-laden wastewater using two replicated, pilot-scale integrated vertical-flow constructed wetland systems (IVCWs) were investigated. Treatment performance affected by seasonal variation and other critical environmental factors was analyzed. Over a study period of 14 months, the system was able to achieve moderate nitrogen removals with mean removal efficiencies of 56.2% and 55.1% for nitrate and TN, respectively, under a low influent COD: N ratio of 1.67. Significant seasonal variations for nitrogen removals were observed, and the order of efficiency was: summer > autumn > spring > winter. Water temperature and DO concentration were the primary factors affecting nitrogen removal. Predictive models with statistical confidence were developed for nitrogen removals employing on-line parameters as indicators.

Keywords: Nitrate-laden wastewater; Integrated vertical-flow constructed wetland (IVCW); Nitrogen removal; Seasonal variation; Influencing factor; Predictive models

Phytoremediation by afforestation on heavy metal contaminated farmlands and the carbon sequestration estimation in Taiwan

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Abstract: The global warming have attracted higher and higher attention that COP 3 (conference of parties) of UNFCCC (United Nations Framework Convention on Climate Change) enacted an international agreement Kyoto Protocol, which was adopted in Japan on December, 1997 and enforced on February 16, 2005. It committed the parties setting international emission reduction targets of greenhouse gases and recognized the carbon sequestration by afforestration. In Taiwan, the farmlands were easily contaminated by irrigating water with the industrial effluent from the irrigation channels. The priority 3 contaminated administration regions of Changhua, Taoyuan and Taichung of heavy metal contaminated farmlands with site numbers of 30, 271 and 204, respectively that area of remediation sites were 53189, 603574 and 162496 m2 up to April 1, 2013. The technologies of heavy metal contaminated sites such as incineration, acid washing, phytoremediation, mixing, removal or new soil, etc. The phytoremediation utilized the photosynthesis of green plants to sequestrate the carbon dioxide from atmosphere to store carbon in the biomass of plants. The objective was to estimate the carbon sequestration by afforestation for the heavy metal contaminated farmlands. The carbon sequestration of 20-year growing tree was estimated by this equation Ctree =Vstem ×Vwhole/stem ×S0 ×C(%). The compensation to farmers from the Forest Bureau could be accumulated to maximum Taiwan dollar 1.1 million/ha for 10 years except area less than 0.5 ha. The regulated sites were all less than 0.5 ha of Changhua county. From the results, the highest carbon amounts were obtained from Acacia confuse of 8327 and 355 ton of Taoyuan county and Taichung city while Zelkova serrata of 7977 and 340 ton; Fraxinus formosana of 7838 and 334 ton, respectively. Therefore, Acacia confuse was the priority recommendation to fix more carbon in biomass for the heavy metal contaminated site remediation.

Keywords: carbon sequestration; afforestation; heavy metal; farmland; phytoremediation

Using Filtering Techniques to Improve Subsurface Contaminant Model Accuracy

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Abstract: Subsurface numerical models for contaminants play an important role in risk assessments and in clean-up processes by estimating or predicting the sizes or shapes of the contaminant plumes. Underestimate or overestimate risk may greatly affect the emergency response or cost-effectiveness of site remediation. The numerical model based on differential equations is an initial value problem that contains limited fate and transport mechanisms. Therefore, the predictions of the numerical model basically relies on the improvement of errors coming from the running model, which may include errors in model mechanisms, numerical schemes and the errors coming from the initial data, unknown or uncertain sources and inaccurate parameters used for transport properties. Filtering techniques are potentially very effective for estimation and data assimilation problems in subsurface contaminant transport because of their advantages to deal with dynamic and stochastic processes. This paper summarizes the results of several recent research projects in using filtering techniques in subsurface contaminant transport models. These techniques include Particle Filter and several variations of Kalman Filter such as Extended Kalman Filter, Adaptive Kalman Filter and Ensemble Kalman Filter. The techniques have been tested using one to three dimensional subsurface contaminant transport models. The results indicate that the prediction error of the data assimilation scheme is 20 to 80% smaller than that from the deterministic model. Furthermore, the results suggest that by applying the correct regional noise structure and parameter estimation, the data assimilation schemes can improve prediction accuracy even more. By the comparison of the plume contour figures, the filtering schemes also have the ability to give predictions that are much closer to any irregular contour shapes of “true” realities than the traditional numerical models. Through absorbing information from observations, the predictive plumes of contaminants from the assimilation system can follow the change of randomized irregular plume shape in real world more closely than a non-assimilation deterministic model.
Keywords: Numerical model, Subsurface transport, Data assimilation; Kalman Filter, Particle Filter

The Syngas Production and Dioxins Yield Characteristics in Sludge Gasification and Incineration

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Abstract: The paper studied on characteristics of sludge gasification and incineration in a self-designed fluidized bed reactor. The LHV of the syngas from sludge gasification increased while gasification temperature increased from 650℃ to 850℃, but decreased while air equivalence ratio increased from 0.3 to 0.4 and then kept almost constant from 0.4 to 0.5. I-TEQ of PCDD/Fs ranged from 3.36ng/Nm3 to 58.64ng/Nm3 in sludge gasification which was much lower than that in sludge incineration. The highest ITEQ was achieved at 750℃ when air equivalence ration was 0.5 in sludge gasification.
Keywords: Fluidized bed; sludge; gasification; incineration; dioxins

Rapid index of Soil Gas Investigation from CPC Gasoline Spill Sites in Taiwan

Hung-Ta Chen, Lien-Kuei Tsao, Chien-Yin Wang, Chi-Hwang Chen, Tung-Li Huang
Abstract: We had investigated 17 oil terminals which were evaluated as the potential gasoline spill sites from CPC corporation in Taiwan. The concentrations of methyl tertiary butyl ether (MTBE), benzene (B), toluene (T)、ethylbenzene (E), o,m,p-Xylene (o,m,p-X) and total petroleum hydrocarbon as gasoline (TPH-g) were obtained by GC/FID for each soil gas sample. According to the concentration of MTBE, which was the most common addition agent of gasoline, it is able to predict the concentration of TPHg in soil gas with high accuracy. Furthermore, the study offer a more efficient way for TPHg prediction from MTBE analysis of soil gas in these gasoline spill

sites . Based on the MTBE analysis of soil gas, it is able to reflect the different degree of gasoline pollution and the actual TPHg concentration of soil gas. Consequently, this study can be applied for monitoring and warning leakage in a real-time system.

Risk Map and Land Reuse Efficiency Assessment of Brownfields in Taiwan

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Abstract: The competing relationships between land values and risk impacts in the process of brownfields regeneration have not been considered in Taiwan. This study aims to combine the three principles of land value, environment impact and health risk to evaluate the current management strategies for contaminated land. The land impact factors of managing contaminated lands have spatial attributes. Thus, a simple risk-screening map is a helpful tool for resolving the issue of spatial variability. The risk maps systematically assess the influence of the land value variation and the environment risk for unused and converted contaminated sites. The risk contribution and land-use efficiency of the contaminated land reuse have been identified by utilising the land reuse value in a risk matrix analysis. The sites without land reuse incentives and with less risk comprise 56% of the analysed sites in Taiwan. However, the high-risk sites with land reuse incentives account for 45% of the sites. This research establishes a simple risk-screening model to provide a reasonable and appropriate brownfield regeneration management strategy. Furthermore, this study encourages the government to consider the management of abandoned factories for the economic incentive of regenerating brownfields with low risk and with few inefficiency issues.

Managing Effective Leak Detection And Repair Programs

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Abstract: Leaks of hydrocarbons from hundreds of thousands of components such as valves, flanges, threaded connectors, pumps and compressors in a petroleum refinery or a petrochemical plant can add up to become significant sources of emissions of volatile organic compounds (VOC) and other hazardous air pollutants. A leak detection and repair (LDAR) program is often used to minimize these emissions. The presentation examines the program implemented by the South Coast Air Quality Management District, a pioneer in LDAR programs, over seven major oil refineries in its jurisdiction and the success of these refineries in applying the state-of-the-art LDAR programs. A brief review of the more advanced, remote-sensing based "smart LDAR" application will also be included. A well-managed LDAR program ensures compliance with the air pollution regulatory requirements and reduces products loss. More importantly, it is proven to be a critical component for some of these refineries as they have fully integrated it into their overall programs aimed at improving safety of the facility, minimizing workers‟ exposure to hazardous environment, and enhancing community relationship by minimizing chronic and accidental releases of air pollutants.

Keywords: VOC; LDAR; leaks; refinery; petrochemical; effective; state-of-the-art

Greenhouse Gas Permitting Requirements and Practices in the U.S.

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Abstract: Since U.S. EPA made the endangerment finding on greenhouse gases (GHG) in December 2009 and issued the final Tailoring Rule in May 2010, GHG permitting has been fully implemented throughout the United State since July 2011. The presentation provides an overview of the GHG permitting requirements, which include two most critical items - the applicability determination and the Best Available Control Technology (BACT) analysis. The applicability thresholds and the EPA‟s five-step “top down” process to determine the BACT standards for

GHG will be discussed. While the program is still relatively new, the presentation will include two case studies to demonstrate how these requirements are being implemented in Southern California. The first case involves a new cogeneration unit that was proposed to be added to an existing 385 MW cogeneration plant in a refinery. The case was subject to the GHG permitting requirements and the BACT analysis was submitted for regulatory review. The second case is for a proposed major reconstruction/modification of a refinery coking unit. It involved detailed analysis for determining the emissions baselines and increments before the reviewing agency determined that GHG permitting requirements were not applicable.
Keywords: GHG; permitting; BACT; applicability

Spatial distribution of perfluorinated compounds in water from East Lake and Hangjiang River, China

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Abstract: This study provided the first spatial distribution of perfluorinated compounds (PFCs) in East Lake (EL) and Hanjiang River (HR) in Wuhan, China. Surface water samples, collected from 48 sites in EL and 23 sites in HR were analyzed for ten PFCs. In EL, C6-C11 perfluorinated carboxylic acids 4 (PFCAs) were common, and where mean concentrations of PFOS (9.06-132 ng/L) >PFOA (15.8-158 ng/L) >PFHxA (n.d-56.3 ng/L) > PFDeA (5.58-30.2 ng/L) > PFHpA (n.d-46.3 ng/L) > PFNA (2.23-12.1 ng/L) > PFUnA (nd.-9.34 ng/L). Spatial distribution simulation showed the highest contamination area was the east region of the lake, followed by the south region. The north and the west regions appeared relatively less contaminated. The spatial distribution patterns of individual PFCs were significantly different. The concentration distributions of C6,C8, C9, and C11 PFCs in East Lake were described by the normal distribution. Variation of PFCs concentrations and weak correlation suggested the existence of different PFCs emission sources. From a spatial aspect, increases in PFCs pollution levels correlated with increased urbanization suggested there are point and nonpoint sources contributors to the PFCs pollution in this area. Concentrations of PFOS in the most regions except the north region exceed water advisory limit (43 ng/L) indicating a potential adverse effect to aquatic organism in East Lake. The total concentrations of PFCs (C6-C10) ranged from 8.90 to 568 ng/ L in HR. PFOA (<LOQ-256 ng/L) and PFOS (<LOQ-88.9 ng/L) dominated. All data were found to be normally distributed in the river. Similar spatial distribution tendencies were found among PFCAs and significant correlations were observed among PFCAs, while no significant correlations were found between PFOS and PFCAs. The distributions of PFCs were highly influenced by the industrial discharge and urban activities. The flux of PFCs from HR to the Yangtze River was estimated in the range of 20 to144 kg/a. More than a half of the samples studied could not meet the drinking water standards and avian wildlife values, suggesting further studies of characterizing PFCs and their potential risk to human were needed.

Phylogenetic Analyses of Human Adenoviruses (HAdVs) in recycled activated sludge of municipal wastewater treatment plant

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Abstract: Human enteric viruses (e.g., adenovirus, enterovirus, and hepatitis A virus) presented in municipal wastewater would be often incorporated in recycled/wasted activated sludge eventually. In spite of potential public health risk, these enteric viruses still have seldom been monitored neither for wasted sludge nor for treated sewage. This study was aimed to survey seasonal distribution of human adenoviruses (HAdVs) in activated sludge from four wastewater treatment plants (WWTPs) based on phylogenetic analyses of hexon gene. Sixteen activated sludge samples were collected for autumn, winter, spring and summer seasons during years 2011-2012. Viral DNAs were extracted by using QIAamp Virual RNA extraction kit. Current results showed that target hexon gene fragments (~143bps) had been successfully amplified in all 16 samples using nested PCR (primer sets: hexAA1885/hexAA1913 and

nehexAA1893/nehexAA1905). The PCR amplicon will be cloned and sequenced for further identifying HAdV serotypes and assessing seasonal division. Results from previous studies for raw wastewaters from the four WWTPs indicated HAdVs serotypes F41, C2, C6, and D (HAdVs concentration about 2*103 ~ 4*106 copise/L) were identified in the 16 wastewater samples and seasonal differences were noticed for three of WWTPs. According to accumulation nature of activated sludge, it was surmised activated sludge would not have noticeable seasonal difference which would be verified soon by this study.
Keywords: PCR. human Adenovirus (HAdVs), activated sludge, phylogenetic analyses

Concentrations of polybrominated diphenyl ethers (PBDEs) in different categories of dust from a typical large open-plan office: indoor distribution, variability, and potential exposure

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Abstract: As a type of persistent organic pollutants (POPs), PBDEs contained in textiles, foams and electrical equipments might be transferred into indoor dust through miniaturization and vaporization. While open-plan design is more frequently applied nowadays, several features of it may influence indoor contamination pattern. In this study, a typical large open-plan office in Shanghai was selected, and the levels of PBDEs in different categories of dust samples (n=55) were determined. The results show that concentrations of PBDEs increase in ascending order from floor dust, dust inside computer tower to dust collected by desk surface wipe. The median value of each category is 230 ng•g-1, 1890 ng•g-1, 7750 ng•g-1 and the range 5 is nd – 4020 ng•g-1，1030 – 75800 ng•g-1，2270 – 39900 ng•g-1, respectively. BDE-209 is the major congener accounting for approximately 90% of total PBDEs, which indicates a low debromination rate in stable indoor environment. PBDEs are generally evenly distributed in floor dust, with only one sample exceeding others by a factor of 10. The variability of PBDE level in desk surface dust and dust inside computer is relatively high, which may lead to wider variation of exposure risk amongst office workers.
Keywords: PBDEs, large open-plan office, indoor dust, occurrence and fate, potential exposure

Photochemical and Acoustic Interactions of Biochar with CO2 and H2O: Applications on Gasification and CO2 Capture

Wei-Yin Chen, Dan Mattern
Abstract: CO2 fixation on carbon is often the first reaction step in CO2 utilization. A critical literature review suggests that aromatic compounds react with CO2 in aqueous solutions at mild temperatures and atmospheric pressure through mild thermal and photocatalytic treatments. Moreover, the impacts of acoustic cavitation induced sonochemical reactions, such as water splitting, graphene oxide exfoliation, and mineral removal on CO2 interactions with carbonaceous material is an unexplored but potentially fruitful research subject. A biochar was selected for ultrasonic and photocatalytic treatments with CO2 and H2O at a mild temperature for revealing its distinctive chemical characteristics. The treatment results in the following remarkable changes in biochar:
- up to 50% increase in heating value,
- 16-fold increase in internal surface area,
- significant removal of minerals (Si, K, Na and Fe) detrimental in power generation,
- 9% additions of hydrogen, and,
- 13% addition (fixation) of carbon.

Fourier-transform infrared spectroscopy suggests that carboxylation occurs during these treatments. Changes in surface area during these treatments suggest that ultrasound and photo-irradiation exfoliates the graphene oxide clusters and produces graphene oxide (GO) platelets. Increase in heating value is a combined result of carbon fixation, mineral removal and, in some cases, hydrogenation. These observations suggest that the governing reactions in the process

are likely to have potentially high benefits on the development of two major technologies, whch will be discussed in the conference:

• solid fuel pretreatment prior to gasification that uses CO2 as the gasification medium, and,

• CO2 capture by char, functionalized nanographene oxide (GO) and nanographene oxide framework (GOF), which has not been a focus of CO2 capture study.

From NPDES to TMDL, Evolution and Challenges of Water Pollution Control in the USA

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Abstract: Prior to the enactment of the Clean Water Act (CWA) in 1972, water pollution control in the United States was largely ineffective. There were two major problems, one was lack of federal regulations, resulting in many states adopting business-friendly approach and relaxing regulations; the other was lack of national water quality standards, making enforcement impracticable. Ineffective government regulation and lack of enforcement actions led to seriously degradation of nation"s water quality. The CWA drastically changed the philosophy and strategy of water pollution control in the USA. Notably, the CWA created two major strategies to control surface water pollution. One is controlling point source pollutions through the National Pollutant Discharge Elimination System (NPDES), which has led to significant improvement of water quality. The other is controlling both point and non-point source pollutions through the Total Maximum Daily Loads (TMDLs) program. TMDLs have been required by CWA but no TMDLs were established until recent years, litigation was the driving force behind the emergence of TMDLs as an important program. TMDLs provide measurable, enforceable, and more effective controls for nonpoint source pollutions, as well as a mechanism for integrating both point and nonpoint pollution source controls. From NPDES permit to TMDL program, it represents a revolution, a paradigm shift, and challenges in surface water pollution control in the USA.

Keywords: water quality, pollution control, point source, non-point source

Streamlined Approach for Environmental Assessment and Cleanup

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Abstract: In recent years environmental professionals are increasingly recognizing the value of implementing a more dynamic approach to environmental investigation and cleanup. This dynamic approach is flexible and recognizes site-specific decisions and data needs. As a result, the investigation or cleanup process can be expedited, with less decision uncertainty and less cost. This dynamic or so-called Triad approach has been adopted by multiple regulatory agencies in the United States and internationally. To develop an accurate conceptual site model, the Triad approach incorporates the elements of systematic project planning, dynamic work plan strategies, and real-time measurement technologies into a decision support matrix designed to manage uncertainties associated with environmental restoration projects. Using innovative rapid sampling techniques to collect “real-time” measurements is a critical element in Triad approach. This paper reviews the important elements of Triad approach and presents its implementation in three projects.

Keywords: Triad approach; real-time data; conceptual site model

A field study on phytoremediation of sediment dredged from urban eutrophic lakes

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Abstract: Phytoremediation is a plant-based environmental remediation technique using plants to stabilize or remove pollutants from the environment. As an alternative option of chemical or physical treatments, phytoremediation is viewed as a feasible and cost-effective technology. A field study on phytoremediation of sediment dredged from Yuehu Lake, a small urban eutrophic lake in Wuhan, was conducted. The phytoremediation effects of nutrients and heavy metals by cattail (Typha angustifolia) under two different sediment moisture conditions (with 35% water

content as aerated sediment, and with 50% of water content as waterlogged sediment) were investigated through 4 times of seasonal samplings of sediment and plants over a year. It was found plant roots did not have significant effects on cation exchange capacity (CEC), organic carbon (OC), total nitrogen (TN) and total phosphorus (TP) of the dredged sediment, while the TN content was higher in the waterlogged sediment than in the aerated sediment. The results of total content and speciation of heavy metals analyzed in the sediment indicated total Cd contents decreased during sediment aeration, mainly resulted from the reduction of exchangeable fraction of Cd ($p<0.05$), but the roles of plants on the total and fractions of the four metals (Cr, Pb, Cu and Cd) were not noticeable. The bioaccumulation of P in T. angustifolia was promoted by waterlogging, and it is a typical species accumulating metals in belowground tissues with the belowground tissue accumulation factor (AF) of 0.58 for Cu, higher than the aboveground AFs for other metals. Based on the biomass per area unit of T. angustifolia, it was estimated that the amount of TN and TP removed from sediment could reach 11.7 g m-2 and 1.8 g m-2 under waterlogged condition, and 30.3 g m-2 and 4.4 g m-2 under aerated condition. The removals of the four metals were similarly higher from aerated sediment than from waterlogged sediment, most because of the higher biomass produced on the aerated sediment. The study revealed significant phytoremediation effects of T. angustifolia on heavy metals and nutrient in sediment dredged from eutrophic lakes, and sediment aeration can enhance the remediation performance.
Keywords：heavy metal pollution; sediment dredging; phytoremediaiton; sediment moisture; metal bioaccumulation

A Mobile, Rapid Platform for the Characterization of Cyanobacteria and Metabolites in Drinking Water Reservoirs

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Abstract: Cyanobacteria metabolites, toxins and taste and odour (T&O) compounds in particular, are present in many reservoirs, posing addition risk to public health and deteriorating drinking water quality. It is important to provide timely information to the managers of reservoirs and water utilities when such facilities are faced with incidents of noxious cyanobacteria. In this study, we have developed a mobile, multidimensional approach for quick diagnosis of the key risks associated noxious cyanobacteria and 7 metabolites. The approach integrates optical (In-situ Fluorescence, IVF), immunoassay (Enzyme-linked Immunosorbent Assay, ELISA), and bio-molecular (quantitative Polymerase Chain Reaction, qPCR) methods, into a mobile vehicle to provide multiple dimensions of information. After collecting the samples in targeted reservoirs, samples were analysed on-site and important information, including the concentrations of major toxin producing and odorant producing genes, cyanobacteria cells, and major cyanotoxins are obtained in about 2 hours. The obtained information is then directly provided to the managers of reservoirs for the characterization of risk associated with cyanobacteria in drinking water, and for the determination of response actions. Compared to conventional analytical scheme, which usually needs 48 hours of turn-over time, this approach may provide multiple dimensions of information in a much shorter time scale. The approach has been successfully applied in more than 10 reservoirs in Taiwan. The approach and a few of the case studies will be introduced in this paper.

Process development of pre-pressure coagulation and sedimentation for removing cyanobacteria in source water

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Abstract: In order to improve the efficiency of cyanobacteria removal by coagulation and sedimentation process, external pressure was applied on algae cells to destroy the gas vesicle within it. As a result, the algae lose buoyancy , and can be easily removed by coagulation and sedimentation. Static coagulation sedimentation experiment was performed with the pre-pressure of 0 ~ 0.7MPa, and compared with pre-oxidation coagulation sedimentation process. The result is perfect in the pressure range of 0.4 ~ 0.7MPa. The turbidity of water after sedimentation is

1.04~0.69NTU. The concentration of Chlorophyll-a is 2.9~0.8μg.L-1, and the removal rate is (95.8~98.8)%. The concentration of CODMn is 3.8~2.9mg.L-1, and the removal rate is (66.2~74.1) %. The concentration of UV254 is 0.0686~0.0646, and the removal rate is (23.7~28.1)%. Pre-pressured process saves coagulant by 50% compared to preoxidation process. The dynamic experiment shows that the turbidity of pre-pressure coagulation and sedimentation filter water is less than 0.25NTU. The concentration of chlorophyll-a is less than 1μg.L-1, and the average removal rate is 99.5%. The concentration of CODMn is less than 3.6mg.L-1, and the average removal rate is 70%. The concentration of UV254 is less than 0.057, and the average removal rate is 33.7%. The filtered water quality is better than the drinking water quality standards.

Keywords：cyanobacteria; pre-pressure; sediment; turbidity; Chlorophyll

Effects of bio-supramolecule and metal ions on the Adsorption of fluoroquinolone antibiotic onto Soils

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Abstract: The effects of bile salts (sodium cholate and sodium deoxycholate, 0-20 mmol/L) or divalent cations (Ca2+, Mg2+, Cu2+ and Zn2+, 0-20 mmol/L) or pH (3.0-10.0) on adsorption of norfloxacin, one tipical fluoroquinolone antibiotic, to three selected soils (Paddy_H, Paddy_G and Red_J) were systematically studied. Norfloxacin shows high adsorption affinity to the three test soils and organic matter content of soils shows great influence on norfloxacin adsorption. The effect of pH on norfloxacin adsorption is originated from the changes of soils" surface charge and speciation of norfloxacin. The presence of divalent cations, typically Cu2+, suppresses the adsorption of norfloxacin onto soils prominently. The adsorption of norfloxacin onto all the test soils follows the pseudo second-order kinetics model. The calculated maximum adsorption capacity obtained from the nonlinear fit of Langmuir isotherm respectively. The conformation of adsorbed norfloxacin molecules was deduced based on the Fourier transform infrared spectroscopy and X-ray diffraction data. These results show that both aquatic solution chemistry and bile salts are important to norfloxacin adsorption on agricultural soils, which could alter the environmental fate and transport of norfloxacin. However, it should be point out that the concentration of norfloxacin and bile salts used in this work is excessively higher than its concentration in natural aquatic environment. Ongoing work is investigating batch adsorption studies at lower concentrations to reveal to what extent the different adsorption properties are observed.

Keywords: adsorption; agricultural soil; bile salts; divalent cation; norfloxacin

Integrated Photobioreactor System for Microalgal CO2 Fixation: Feasibility Testing and Energy Appraisal

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Abstract: An integrated process involving alkaline absorption of carbon dioxide, a photobioreaction (containing microalgae cells of Spirulina maxima) for CO2 fixation and biomass growth, and a membrane unit for cell separation was developed, with works spanning from laboratory-scale to pilot-scale testing. The laboratory-scale study systematically demonstrated the capability of CO2 removal through wet scrubbing using diluted wastewater as the scrubbing liquid, and the potential of biomass growth in the CO2-enriched wastewater. The NaOH-alkalized wastewater provided adequate CO2 absorption capacity (~0.5 g CO2 g-1 NaOH at 0.5M) and effectively converted the adsorbed CO2 into usable bicarbonate to support the growth of S. maxima, a species that thrives in highly alkali condition. By virtue of the hydroxide reaction with

CO2 that form aqueous carbonates (lowering the pH) and the photosynthetic activity that consumes carbonates (increase the pH), the solution pH can effectively be used as the controlling parameter in operation of the system. The pilot-scale system with an array of flat-panel photobioreactors having a total capacity of 2 m3 was designed on the basis of the laboratory results, and was operated on the roof of a wafer fabrication plant using natural gas boilers for six months. The exhaust temperature fluctuates between 50 and 60 C, and the CO2 content was approximately 16%. With a weekly harvesting schedule, the average weekly fixated CO2 was 40 kg and the recovered dry biomass was about 120 g. Membrane filtration process was adapted to separate the microalgae cells from solution so that the permeate water can be reuse for wastewater dilution in the cell cultivation phase. In additional to the test results, the concept of the integrated process utilizing wastewater as the CO2 scrubbing medium and solar panel for energy supplies for the system operation makes the process sustainable even for smaller –scale, plant-level operations. Appraisals from energy and economic standpoints for the integrated process are also examined using the data obtained from the pilot-scale testing.
Keywords: Carbon dioxide, photobioreactor, energy

Microbial community analysis of dry anaerobic digested sewage sludge under mesophilic condition

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Abstract: The diversity and structures of the bacterial and archaeal community in a dry anaerobic digester treating dewatered sewage sludge under mesophilic condition were investigated by a combination of 16S rRNA clone library and denaturing gradient gel electrophoresis. During stable reactor performance, ninety-seven bacterial sequence types among 16 phylogenetic groups and thirteen archaeal sequence types among 4 phylogenetically diverse groups were identified by sequencing two 16S rDNA gene libraries. Sequencing and phylogenetic analysis of bacterial PCR products revealed that the bacterial library was dominated by uncultured and unknown bacteria (54.05% of total clones examined). The sequences related to Chloroflexi phyla (18.92%) were most common in other known groups, followed by the genus Syntrophomonas (8.11%) and Firmicutes (4.73%). In archaeal library, however, most of rDNA clones (97.42%) were affiliated with the known methanogenic Archaea. The genus Methanosarcina (69.68% of total archaeal clones) and Methanoculleus (27.1%) constituted the majority of the total methanogen population and Methanospirillum sp. played a relatively minor role in the digester. The dominant divisions or sequence types representing 70.63% and 96.77 of microorganisms in the bacterial and archaeal libraries were recovered from the denaturing gradient gel electrophoresis (DGGE) bands of V3 regions in 16S rDNAs. This study gave a first insight of the overall microbial structure in a dry anaerobic digester treating dewatered sewage sludge under mesophilic condition and also indicated DGGE was useful in displaying its dominant microbiota.

Degradation of Extracellular Polymeric Substances (EPS) in Anaerobic Digestion of Dewatered Sludge

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Abstract: Degradation of extracellular polymeric substances based on high-solid anaerobic digestion was investigated. The organic matters of Extracellular Polymeric Substances (EPS) in the sludge decreased 24% and shifted from the tightly bound EPS (TB-EPS) fraction to the Slime fraction during anaerobic digestion. From the molecular weights distribution, the TB-EPS fraction of raw sludge was more complex than the other two fractions, whereas the Slime fraction of digestate was the most complex. From the three-dimensional excitation and emission matrix (EEM) fluorescence spectra results, the tyrosine-like substances were converted to tryptophan-like substances, while more humic-like substances were produced and accumulated in the Slime fraction with the reduction of protein-like substance. The degradation of organic matters and the

accumulation of soluble microbial products (SMP) in Slime fraction can result in the decomposition of floc structures. The distribution patterns of cations in EPS were not affected by anaerobic digestion, while the amounts of cations were reduced dramatically which enhance the further decomposition of floc structures.
Keywords: Extracellular polymeric substances (EPS); Degradation; Anaerobic digestion; High solid

Coagulation-microfiltration process for treatment of algae-rich water

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Abstract: Coagulation used as pretreatment combined microfiltration membrane (MF) process in a pilot scale was applied for the treatment of Taihu Lake water. High performance size-exclusion chromatography (HPSEC) with detectors of UV and TOC and three dimension fluorescence excitationemission matrix (3DEEM) were applied to elucidate the effect of molecular weight (MW) distribution and hydrophilicity/hydrophobicity on reversible and irreversible membrane fouling. Results obtained showed that pretreatments could remove not only the almost of large MW organics, but also partial of medium and small ones. The analyses of chemical cleaning solutions showed that organics in strong hydrophobic acids (SHA) and neutral hydrophilic (Neut) fractions were much higher than those in weakly hydrophobic acids (WHA) and charged hydrophilic (Char) ones, and that MW distribution was in regions of medium and small MW. It can be conclude that the large MW organic matters composed mainly of SHA and Neut fractions were most responsible for the reversible membrane fouling, and that Neut fraction with medium and small MW caused the irreversible membrane fouling. 3DEEM fluorescence analysis exhibited that foulants rejected by MF and in the chemical solutions was consisted mainly of aromatic proteins and soluble microbial products, suggesting that they are contribute to irreversible membrane fouling.
Keywords: membrane fouling; molecular weight distribution; hydrophilicity/hydrophobicity; 3DEEM; pretreatment.

Lignin Biodegradation by Anaerobic Combined with Aerobic Sludge

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Abstract: Lignocellulose is an important renewable bio-energy and bio-resources. Because of the high molecular weight and the presence of various stable linkages, lignin is difficult to be degraded and become the principal contaminant in the effluent of pulp and paper industry which lead the wastewater difficult to be regenerated. So it is important to develop an economic and environmental security wastewater treatment technology for lignin degradation. This study focused on the biodegradation of lignin by anaerobic combined with aerobic sludge. Results revealed that COD removal rate of lignin solution increased by 7.1% through coupled anaerobic and aerobic sludge than solely by anaerobic sludge. The glucose and ethanol were better co-metabolism substrates for aerobic sludge which lead COD removal rate increase by 8.4% and 9.6% respectively than control (no co-metabolism). During the coupled anaerobic-aerobic biodegradation process of lignin, lignin-related monomer compounds such as 2,6-dimethoxyphenol and vanillin were degraded to low molecular weight organic acids such as butyric 10 acid and 3-methylbutanoic acid in the anaerobic phase, and in further the intermediate products such as 3-hydroxy-4-methoxybenzoic acid, Octadecanoic acid and 4-hydroxybenzoic acid were degraded in the aerobic phase.
Keywords: lignin, coupled anaerobic-aerobic treatment, biodegradation, co-metabolism.

Noise Harm and Noise Control Engineering 噪声伤害和噪声控制工程学

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摘要：本文以充分的证据说明噪声伤害已成定论。噪声控制工程学应运而生，并形成自己的学科体系，建立了成套的标准规范、发展了各种噪声控制技术，以及实现了工程化产业化。本文论述了噪声控制工程学和的诞生、学科体系和发展。
Abstract: It is already proved that the noise is harmful to human beings. The study of Noise Control Engineering has been born and developed. It is formed the system of standard and technology. Furthermore, it has been industrialized. With the development of the whole society, noise turned to be a major problem to daily life, and environmental acoustics become more and more important. Recently, environmental acoustics has changed the concept of acoustic quality.

Synergetic effect of copyrolysis of coking-coal tailings and scrap tire

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Abstract: An experimental study on the synergetic effect of copyrolysis of coking-coal tailings and scrap tire was investigated in this paper. Coking-coal tailings and scrap tire were analyzed in a thermobalance with a heating rate of 10℃/min under atmospheric pressure with nitrogen as balance gas. The operation temperature of the copyrolysis is from 50 to 900 ℃, and the blending ratio of cokingcoal tailings is 0, 1/2, 2/3, 3/4, 4/5, and 1. The results indicated that there exist synergetic effects in the copyrolysis of coking-coal tailings and scrap tire. The proportion of coking-coal tailings has great effect on the weight loss rate and the gas yield of copyrolysis; the total weight loss rate becomes lower with the growing of proportion of coking-coal tailings, and the second weight loss step becomes weaker and weaker. When the proportion of tailings grows to 4/5, there was no difference between the different steps during the copyrolysis. However, the proportion of feedings has an inhibitory effect on the gas yield, and the effect becomes most significant when the proportion of coking-coal tailings is 1/3.

Biosorption of Cu2+ from aqueous solution using De-oiled soybean treated by NaOH (DOSNaOH): Isotherms, kinetics and thermodynamics

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Abstract: De-oiled soybean treated by NaOH (DOS-NaOH) was used as an effective biosorbent to remove the Cu2+ cations from aqueous solution. Batch biosorption experiments were conducted to investigate the effects of solution pH value, biosorbent dosage, initial Cu2+ concentration and so on. DOS-NaOH before and after biosorption were characterized by BET, FTIR, SEM and EDS for understanding the behavior and the mechanism of Cu2+ removal process. The FTIR analysis indicated that the functional group such as amine, carboxyl, hydroxyl and either on DOS-NaOH might be the active binding sites for the Cu2+ biosorption. From the EDS results, it can be seen that DOS-NaOH was adsorbed so plentiful that Cu2+ occupied a considerable weight up to 12.20%. The SEM analysis also demonstrated that copper existed on DOS-NaOH surface after biosorption. The equilibrium data were analyzed using three isotherm models, namely Langmuir, Freundlich and Temkin isotherm, indicating that the Langmuir isotherm was more suitable to describe the biosorption data at the entire concentration range than the Frundlich and Temkin isotherm, and maximum Cu2+ uptake achieved was 112.36 mg/g. The kinetics study results showed that both intra-particle diffusion and boundary layer diffusion might affect the rate of Cu2+ biosorption process. Besides, the pseudo-second-order model with correlation coefficients over the range of 0.9899 to 1.000 matched the experimental data better. Thermodynamic studies demonstrated that the biosorption of Cu2+ onto DOS-NaOH process was spontaneous and 11 endothermic. DOS-NaOH was proved to be a low-cost and efficient biosorbent for the removal of Cu2+ cations from aqueous solution.
Keywords: Biosorption; Cu2+; De-oiled soybean

Relationship Between Lake Whatcom Algal Densities, Water Quality, And Filtration Rates At The Bellingham Water Treatment Plant, Wa.

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Abstract: During the summer of 2009, the City of Bellingham experienced severe reductions in filtration rates at the City's water treatment plant (WTP), resulting in mandatory water onservation measures. Since then, summer filtration rates continue to approach critical levels. The slow filtration appeared to be associated with specific types of algae in the source water. In 2011 we conducted a study to identify the types of algae associated with filter clogging and to determine whether there were water quality indicators that could be used to predict slow filtration rates. Water and algae samples were collected 3x/week at the WTP screen house from June through November, 2011. Temperature and dissolved oxygen were measured at the site; alkalinity, conductivity, pH, turbidity, nutrients (total phosphorus, soluble phosphate, total nitrogen, nitrite/nitrate, and ammonium) and chlorophyll were measured in the laboratory. Algae were settled in counting chambers, then identified and enumerated. Aphanocapsa/Aphanothece (cyanobacteria), Synedra, and Aulacoseira (diatoms) were negatively correlated with filtration rates (pvalues<0.05). Conductivity, alkalinity and total phosphorus were significantly negatively correlated with filtration rates while turbidity, nitrite/nitrate and total nitrogen were positively correlated with filtration rates. Alkalinity had the strongest correlation with filtration rate (Kendall‟s tau = -0.403, p-value<0.0001). Algae counts required approximately 3-4 days to process compared to alkalinity measurements, which required less than 1 hour, making alkalinity a potential early warning indicator for filter clogging events.

The carbon source absorption, releasing and utilization within A-A2N wastewater treatment process

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Abstract: The A-A2N wastewater treatment process includes a anoxic tank in the front. The carbon source absorption, releasing and utilizing in the anoxic tank, aerobic tank was studied for wastewater with C/N ratio of around 3. The effect on nitrogen and phosphorous removal is also studied to provide an indepth understanding of the A-A2N wastewater treatment process for treatment of low C/N ratio wastewater. Within the anaerobic process, 53.3% of carbon source was stored within bacterial as PHB. The stored carbon source and other external carbon source in the recycling activated sludge can provide the carbon source for denitrifying Phosphorus removal Bacteria (DPB). 77.7% of the absorbed carbon source can be released within anoxic tank to provide for the carbon source for DPB in nitrogen and phosphorous removal. More PHB can be stored if large amount of small molecular weight and easily degradable organic matter exists. During the 8 months experiment, the COD、TN、NH4+ and TP in the effluent exceed the GB18918-2002 first grade A standards.
Keywords: Low C/N ratio; Nitrogen and phosphorous removal; carbon source; A-A2N wastewater treatment process

Experimental Conditions Optimization and Kinetic Studies on the Decolourization of Azo Dyes by Dactylococcopsis acicularis whith Mediator Catalyzed

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Abstract: Microbe is widely used in degradation of organic wastewater because of its environmentally friendly. However, most microbe needs very long time to degrade organics, especially azo dyes. In that case, redox mediator was reported. A kind of microbe which had degradability was screened, it turned to be Dactylococcopsis acicularis which was a kind of cyanobateria. According to the Design Expert experiment, the best growth condition of this algae was determined. This algae could discolor Orange Ⅱ quicker than other microbe. It could make

100mg/L Orange discolored totally within 6 hours under the optimum condition which was determined by Design Expert experiment. However, in the presence of redox mediator riboflavinyl-sulfosalicylic acid-carboxylate ester-iron(Ⅱ) complexes (RF-SA-Fe) which was synthetized in the lab, the Dactylococcopsis acicularis-mediaor system could discolor 100mg/L Orange Ⅱ totally within 3 hours under the optimum condition which was also determined by Design Expert experiment, this showed the redox mediator improved 1 time rate of decoloration of Orange Ⅱ. What"s more, we also established the kinetic model, analyzed the discoloration mechanism. Compared to the traditional methods, this compound system is more efficient and economic.

Keywords: Dactylococcopsis acicularis; Redox Mediators; Azo Dyes; Experimental Conditions Optimization; Kinetics.

Priority control screening and water quality benchmarking of toxic chemicals in China: necessity, method and a case study

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Abstract: The priority control screening (PCS) and water quality benchmarking (WQB) of toxic chemicals in water are key steps to ensure the safety of drinking water and aquatic ecosystem that is the crucial goal of water environment management. Owing to the different levels of social-economic development in different countries or regions, the PCS and WQB of toxic chemicals in water must be determined in accordance with their specific water environment situations. However, in many developing countries like China, the PCS and WQB of toxic chemicals in water were mainly introduced from the developed countries. A method based on the ecological and health risks was proposed, and a platform named Bayesian Matbugs Calculator (BMC) was developed for the PCS and WQB of toxic chemicals in water. The BMC platform is based on the five commonly-used species sensitivity distribution (SSD) models, Bayesian inference, WinBUGS software, and Matlab graphical user interface (GUI). The best model for fitting SSD is determined by the deviance information criterion (DIC) value between the modeled and collected toxicity dada. Lake Chaohu, the fifth largest freshwater lake in China, was taken as a case study. Eleven water samples were collected from the Lake and 69 toxic organic pollutants (TOPs) were detectable, including 25 individuals of organochlorine pesticides, 6 individuals of polychlorinated biphenyl, 16 individuals of polycyclic aromatic hydrocarbons, 12 individuals of organophosphorus pesticides, 3 individuals of herbicides, and 7 individuals of Phthalates. The BMC platform was used for the PCS and WQB of toxic chemicals in the lake water. The top ten TOPs with ecological risk greater than 10-4 were determined as parathion, dieldrin, methamidophos, malathion, methoxy DDT, dichlorvos, carbaryl, endosulfan I, p,p'- DDD and p,p'-DDT. The WQB based on NOEC for protecting aquatic organisms was suggested. Uncertainty analysis for the PCS and WQB was also performed.

Defluoridation from aqueous solution by chitosan modified natural zeolite

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Abstract: A novel hybrid material, chitosan-modified zeolite (Ch-Z), was synthesized for defluoridation. The structure was characterized by fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), X-ray diffraction (XRD), the Brunauer, Emmett and Teller (BET) and thermogravimetric analysis (TGA). The maximum adsorption capacity for fluoride onto Ch-Z was 4.16 mg/g with an initial fluoride concentration of 40 mg/L, which was almost three times higher than that of unmodified zeolite. The adsorption kinetics of fluoride onto Ch-Z and zeolite followed the pseudo secondorder and intra-particle diffusion models, respectively. Based on a nonlinear method, the adsorption of fluoride onto Ch-Z fitted well to the Freundlich and Redlich-Peterson isotherm models. Furthermore, various physicochemical parameters affecting the adsorption of fluoride onto Ch-Z were investigated. It was observed that the maximum uptake of fluoride occurred in a pH range of 4.5-5.5. The presence of anions had a negative effect on the adsorption of fluoride, mainly due to the resultant pH changes, especially in the cases of CO32-

and PO43-. Ch-Z was applied to treat real water sample with high fluoride concentration to further investigate the practical application of the adsorbents.
Keywords: Fluoride; Zeolite; Chitosan; Adsorption.

Remediation of Heavy Metal Contaminated Soil Using a Solidification/Stabilization Technology

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Abstract: It is necessary to carry out research and development on the contaminated site remediation equipment as well as engineering demonstration, which not only conforms to the national strategic needs, but also accords with the development concept of resource-economical and environment-friendly society. To further draw the attention of both at home and abroad to the problem of contaminated soil remediation, and increase the communication and discussion among experts in the same field, this paper introduces an engineering example of curing repair in situ for the heavy metals compound contaminated soil. After investigate the contaminated site, the scope of heavy metal pollution and the repair target are determined. Based on that, technologies of remediation are compared. Then the key links of the whole project are analyzed and discussed. For example, the curing processing technology route, the control of main pollutants such as noise, dust and waste water during the construction period are included. This project adopts the HAS water-tolerant soil curing agent as solidified material which is researched and developed independently. At last a feasible engineering technical scheme is provided. After remediation, the contaminated soil site meets the Toxicity Characteristic Leaching Procedure （TCLP） limit concentration from American evaluation standards of contaminated site remediation. At the same time, the strength performance of the solidified soil body meets the demand of the bearing capacity of soil foundation from following foundation engineering, which is suitable for commercial and industrial land development.
Keywords：solidification/stabilization; heavy metal; polluted soil; remediation

Monitoring and Reporting Procedures Required by National Pollutant Discharge Elimination System Permit for the Public Health Use of Pesticides

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Abstract: The use of pesticides for controlling populations of vectors such as mosquitoes is an important part of preventing vector-borne disease outbreaks. In California, pesticide use is typically regulated by several state environmental and public health agencies including the Department of Public Health, Environmental Protection Agency, State Water Resources Control Board, and Department of Pesticide Regulation. In recent years, federal, state, and local clean water regulations have resulted in significant changes to water management practices, some of which have affected vector control operations. On March 1, 2011, the State Water Resources Control Board adopted the Statewide National Pollutant Discharge Elimination System Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications in response to National Cotton Council of America v. EPA (6th Cir., 2009) 553 F.3d 927. This General Permit requires permittees to undertake specified monitoring and reporting of pesticide usage. The General Permit also allows permittees to choose between individual monitoring and reporting or participation in a statewide coalition program. The State Water Resources Control Board and vector control agencies have developed a mutually beneficial and comprehensive plan to protect both public health and the environment. The details of the resulting monitoring and reporting procedures will be demonstrated.

An Electrochemical Membrane Reactor for a Recycled Flue Gas Desulfurization Process

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Abstract: In the current process of removing sulfur dioxide, the high cost and treatment of fuel-gas desulfurization products are still the two bottlenecks that need to be resolved. We presents a novel method that can regenerate the adsorbent (NaOH) and obtain sulfur resources as H2SO4 and energy recovery (H2) from flue gas desulfurization (FGD) products by using an electrochemical membrane reactor. The effects of the operating parameters, such as the current, the initial concentration of the three chambers, the flow rate, and the power supply mode on the regeneration and current efficiency were analyzed, and the optimal operating condition of the lab-scale electrochemical membrane reactor was obtained. Under this optimal condition, the current efficiency of H2SO4 production and NaOH regeneration were about 85% or above and as high as 90% correspondingly. In addition, the process cost from the consumption of energy is estimated to be 0.81 $/kg sulfur; therefore, the profit from the electrolytic products is higher than the price of the electricity. Notably, the method is appealing both because it can expediently regenerate the adsorbent with no secondary pollution and because it is an economically attractive way to dispose the huge amounts of FGD residuals.
Keywords: Flue gas desulfurization; Membrane electrolysis; Regeneration; Electrochemical; Sodium sulfate

On Climate Changes and Sustainable Water Environment: Impacts and Strategic Adaptation

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Abstract: The paper addresses the impacts of temperature on the water cycle and quality of local and regional significance. Temperature as a master variable of water properties such as density, viscosity, surface tension, vapor pressure, and phase transition, directly affects the hydrogeological cycle and indirectly alter the biological and chemical cycles of natural water environment, which in combination, can bring drastic changes in water quality. Temperature-dependent changes such as extreme hydrological events can impact water storage capacity of reservoir. Temperature change can alter thermocline, oxygen depletion, decrease self-purification capacity, increase in dissolved solids, and seawater intrusion, which have significant influence on water quality. Furthermore, climate change, specifically warming, can impact the performance and reliability of water infrastructures, namely water treatment plant and reservoir. Holistic water use management and increase in water reuse are a few short-term options available for dealing with the impacts of climate changes on water environment.

Degradation of Dichloromethane by Zero-valent Copper and Vitamin B12

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Abstract: Dichloromethane (DCM) is a recalcitrant groundwater contaminant that shows nearly no reactivity with zero-valent iron (ZVI) nanoparticles. In this study, we found that a combination of zerovalent copper (Cu0) nanoparticles and vitamin B12 can catalyze the degradation of DCM effectively under reducing conditions. Batch experiments revealed that 90% of DCM (26.4 mg/L) was rapidly degraded within 1 h in the presence of Cu0 nanoparticles (2.5 g/L) and sodium borohydride (1 g/L). The observed pseudo-first-order rate constant (kobs) was 2.19 h-1, corresponding to a surface area normalized rate constant of 0.052 L/m2/h, which is 2–3 orders of magnitude higher than for other zero-valent metals. A synergistic effect of Cu0 nanoparticles on the reductive degradation of DCM by vitamin B12 (an electron mediator) was found. Approximately 99% of 26 mg/L DCM was degraded rapidly within 2 h by the Cu0– B12 system. The reaction rate of DCM degradation by the Cu0–B12 system was five times greater than that of using vitamin B12 alone. The DCM degradation rate is a function of the Cu0 nanoparticle and

vitamin B12 dose. Increasing the dose increased the observed reaction rate. Product analysis indicated that the degradation of DCM involved hydrodechlorination. Soluble copper ions generated by the dissolution of Cu0 nanoparticles were lower than the World Health Organization drinking water standard, which suggests that the use of Cu0 nanoparticles under reduction conditions may be potentially useful. It is expected that the combination of Cu0 nanoparticles and vitamin B12 (or other electron mediator) system may have the potential for treating recalcitrant groundwater contaminants that cannot be degraded by ZVI technology. on all ancillary services ordered by the outsourcing providers to process these loans.

Exergy analysis of energy utilization for China's railway transport enterprises

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Abstract: The energy depletion of railway transport has yield great influences on the railway enterprises, in the context of low-carbon economy. This study aims at demonstrating the circumstance of energy utilization and structure of China"s railway transport in the period of the "eleventh five-year plan" from 2006 to 2010. The total exergy and exergy efficiencies have been calculated based on the scenario analysis of energy structure. The preliminary results indicate that: (1) the major fuels for China railway transport are diesel, coal and electricity, which account for 98% of the total energy consumption, whilst the transport system is mainly differentiated by the functionality, i.e. main production task (freight and passenger transportation) and auxiliary tasks (dispatching, overhauling, and daily life); (2) The total exergy consumption is calculated as 491.59 PJ in 2006 and 480.19 PJ in 2010, which is approximately in accordance with China"s economic growth rate. (3) With railway electrification and green technology being emerged in the transport system, the energy structure is considered upgrading gradually, e.g. more environment-friendly energy is used to be the alternative fuels. (4) The weighted mean of exergy efficiencies since 2006 to 2010 ranges from 26.41% to 26.62%, with its corresponding mean as 26.51 ± 0.06%, which is less than the conventional efficiency 28%, due to the irreversibility of exergy loss. In addition, both time and structural variation of the total exergy consumption and efficiency provides an insight to China's socio-economy, but also helps improve the national energy policies.
Keyword: Railway transport; Energy utilization; Energy structure; Exergy; Low-carbon economy

ESA's Role in Delta Protection

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Abstract: As California's main water source, surface freshwater is primarily from precipitation in the Sierra and northern mountain areas. However, two-thirds of California"s water demand are in Central Valley for agriculture use and in Southern California for the uses of agriculture, households, and industries. Since early 1900"s, California has built an enormous network to transporting water from the Sacramento River, Sierra mountains, and Colorado River to the thirsty Central Valley and Southern California. The network has become the main arterial to California"s economic and urban development. In the meantime, operation of the massive pumps in the south of the Bay Delta by the Federal Central Valley Project and State Water Project are exerting sever stress to the Delta"s water quality, levee structure, and eco-system. In 2005, a coalition of environmental organizations sued the federal Department of Interior in a federal district court to challenge the 2005 Biological Opinion by the Fish & Wildlife Services for its no jeopardy and no adverse modification finding on Delta Smelt from the pump operation in Delta as arbitrary, capricious, and contrary to law. The judge in the federal court delivered his decision in 2007, which agreed with the plaintiffs" claim and ordered reduction of water transportation as a interim remedy before a new Biological Opinion is prepared to comply with the Endangered Species Act (ESA). Stakeholders including federal and state regulatory agencies and water utilities came together from January 2006, working on a habitat recovery plan to meet the ESA Incidental Taking requirement so that water transportation can continue without further harming the threaten species. In March 2013, the draft Bay Delta Conservation Plan (BDCP) was issued, which proposed to construct two pipelines with approx. 12 m diameter and 50 km long to convey high quality water from the north of Delta to the existing pump plants and to construct numerous

restoration sites to protect threaten species and other species in the Delta. It is estimated that 24.5 billion will be used to complete the projects and for 50 years of maintenance. Success of the projects will not only benefit people in Southern California, the experiences and lessens from the processes and projects can be beneficial as well to environmental protection professionals all over the world.

Preparation and Evaluation of Carboxymethylpullulan-Aluminium Chloride as a Coagulant for Water treatment: A Case Study with Kaolin

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Abstract: To cut aluminum based flocculants use is of particular interest in the water treatments. We here evaluated a novel composite flocculant, which is made of carboxymethylpullulan-aluminium chloride in a lab-scale system for flocculation of kaolin suspensions. The coagulation behavior was examined through jar tests and results showed that the coagulation efficiency of carboxymethylpullulan-aluminium chloride was more effective than carboxymethylpullulan or aluminium chloride in removing turbidity in water. The optimum treatment conditions obtained by response surface methodology (RSM) were determined as pH 6.50, carboxymethylpullulan concentration at 13.03 mg/l and AlCl3 concentration at 94.87 mg/l, respectively. Zeta potential measurement and photometric dispersion analysis demonstrated that aluminium chloride had more capability on charge neutralization and carboxymethylpullulan was good at absorption and bridge effect. The composite flocculant holding these two advantages obtained a favorable flocculating effect, as well as decreased in the dosage of AlCl3 which may arise secondary environment pollution. The results presented here provide insight to develop environment-friendly composite flocculants prepared from water-dissolved polysaccharide and inorganic flocculant.
Keywords: Flocculation, Composite coagulant， Carboxymethyl pullulan, Aluminium chloride, Response surface methodology, Coagulation kinetics

High Efficiency Microwave-Enhanced Catalytic Degradation (MECD) of Environmental Organic Pollutants with Nano-Sized Metal Oxides

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Abstract: Application of the microwave-enhanced catalytic degradation (MECD) method on the abatement of environmental organic pollutants such as phenol derivatives in aqueous phase using microwave hydrothermal prepared nickel oxide and cupric oxide were studied. A mix-valenced metal oxides was prepared in aqueous solution through a precipitation with basic media and an oxidation by sodium hypochlorite with/without microwave-assisted heating. They were characterized by X-ray (XRD), infrared spectroscopy (IR), temperature programmed reduction (TPR), and transmission electron micrographs (TEM). Their catalytic activities towards the degradation of phenols were investigated through continuous bubbling of air during the liquid phase and evaluated quantitatively with high pressure liquid chromatography (HPLC). Also, the effect of the kinds of catalyst, temperature, pH, initial concentration, and dosage of catalyst on the efficiency of degradation was investigated. The results showed that the most of the phenol derivatives were completely degraded using the high efficiency MECD method within 15 min under [H+] = 1.0 M, T=40◦C, and C = 200ppm over metal oxide. In this work, a novel and environmentally friendly process for the degradation of organic pollutants has been successfully developed.
Keywords: microwave-enhanced catalytic degradation (MECD), nano, organic pollutant

The Sustainable Development of Cleaner Production and Circular Economy for PCB Industry

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Abstract: As reported at the previous OCEESA conference in 2012, a new process has been developed proven equipment designed and installed in factories for PCB (printed circuit board) manufacturers. This water and energy saving unit has greatly reduced the operation cost and minimized the waste discharged for protecting the environment through CP/CE measures. Further development is under way for the recovery of Cu content in the waste stream; nitric and sulfuric acids as well as other metallic components. Most of all, through microwave technique, nano-meter size for refined copper oxide which is used as the primary coating material for PCB is targeted. The project will be sponsored and partially funded by the Science Council, in Taiwan through its Joint Industry- Academic Institution Incentive Program Once the successful results are obtained, it will be a revolution in chip- making process for PCB industries. Results and progress will be presented and discussed at the Conference.

Keywords: PCB industry; CP/CE, microwave technology.

In-Situ Chemical Oxidation Ozone Implementation

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Abstract: A former natural gas processing station is impacted with total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes in groundwater. A remedial process optimization concluded that the historical air sparging/soil vapor extraction system and the existing groundwater extraction and treatment system offered no further benefit in meeting remediation goals and recommended to implement an in-situ chemical oxidation (ISCO) system. A capture zone analysis through groundwater flow modeling - MODFLOW indicated that 85%, 90%,and 95% of injected oxidant could be captured when well pair is injecting and extracting at 2, 5, and 10 gallon per minute, respectively. Ozone was selected among four oxidants based on implementability, effectiveness, safety, and media impacts. A bench test concluded that ozone demand was 8 to 12 mg ozone/mg TPH and secondary groundwater by-products of ISCO include hexavalent chromium and bromate. A pilot study with pulsing operation of two sparging wells at 2 lbs/day concluded that optimum frequency of ozone sparging is 60 minutes in order to reach a maximum radius of influence of 20 feet. TPH concentrations within the treatment zone decreased by 97% during two months of ozone sparging. Concentrations of hexavalent chromium and bromate increased from non-detect to 44 and 110 µg/L, respectively, during the ozone sparging but attenuated to non-detectable concentrations within three months of system shut down.

Multi-factor analysis of water area changes in Hanjiang River Basin

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Abstract: Hanjiang River basin is very rich in water resource which contains a total of more than 500 billion cubic meters of surface water. However, after years of development of cities along the river, the planning of seven hydropower stations and the construction and operation of the middle-lower reaches of eight hydropower stations will be a tremendous impact to the resources in Hanjiang River basin. The district"s water area data is extracted by multitemporal remote sensing data from TM/ETM of LANDSAT. The correlation method is used to analysis the affection

of temperature, precipitation, evaporation, water consumption and hydropower cascade development project to the water area changes of Hanjiang River basin. The results show that the water area of Hanjiang River basin has decreased from 3084.10 km2 1990 to 2422.12 km2 2010 and the hydropower cascade development project is a tremendous impact on the basin surface area change. The impact of cascade hydropower development will pay close attention in watershed management in Hanjiang River basin.
Keywords: Cascade hydropower development; Surface area change; Hanjiang River basin; correlation analysis

Modeling analysis method of multifactor on Water Blooms in Hanjiang River Basin
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Abstract: There are great international and domestic concerns about the potential impact on water eutrophication and ecosystems in Hanjiang River basin, such as the Cascade Hydropower Project , the South-to-North Water Diversion Project (SNWDP) and the other water diversion and irrigation projects. This study aims to analyze the influencing factors on impacting water bloom problems in Hanjiang River system by utilizing a multi-factor model which is established by using indicators of climate change, water quality, hydrological regimes and water quantity. Specifically, the developed parametric modeling is based on Grey Correlation (GC), Fuzzy Comprehensive Evaluation (FCE) and Analytic Hierarchy Process (AHP). Firstly, we use a correlation analysis method to analyze the reason of the water bloom. The determined factors are air temperature, precipitation, evaporation, water consumption and velocity of water flow. Afterwards, we set up a multi-factor model to evaluate the above factors and give the result. Finally, we drew a grading figure to explain the trends of water bloom in Hanjiang River. The modeling analysis method of multifactor can provide new ideas for watershed management institutions of Hanjiang River basin.
Keywords: Water bloom; Multifactor; Hanjiang River basin; correlation analysis

Ecoregion based environmental protection mechanism in Taihu Lake basin
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Abstract: Taihu Lake, located in the Yangtze Delta plain, is the third largest lake in China. It provides drinking water for millions of residents and is an important resource for biodiversity, fisheries, migratory birds, endangered species, as well as ecotourism. The eutrophic Taihu Lake has been selected as key pollution control objective since 1990s. However, pollution in this area has been ongoing for decades despite efforts to reduce pollution that were not effective enough. Environmental protection in Taihu Lake basin calls for more efficient management mechanisms. National Meta-Program for Science & Technology of Water Pollution Control initiated a research program that focuses on environmental management mechanism design based on ecoregion zoning and water ecosystem health protection in Taihu Lake basin since 2011. “Core” components of this research program include: 1) geographical, ecological, chemical, and physical characteristics investigation in Taihu Lake basin; 2) ecoregion zoning based on land use, lake water quality, morphometry, and watershed characteristics; 3) protected species identification by recognizing the spatial differences in the capacities and potentials of ecosystems; 4) ecoregion-specific criteria for water quality and pollutants discharge in Taihu Lake basin; 5) ecological monitoring with improved scientific understanding of freshwater ecosystem integrity and major habitat dynamics; 6) structuring and implementing ecosystem management strategies across different agencies.

Effect of flow rate on environmental variables and phytoplankton dynamics: results from field enclosures

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Abstract: The main objectives of this work were to investigate how the flow rate affect phytoplankton dynamics and species interactions in natural enclosures and if such an effect was altered with physical and biological variables. Three sets of enclosure experiments were conducted in an artificial lake to investigate the effect of flow rate on phytoplankton dynamics and related environment variables. Lower biomasses in all the flowing enclosures showed that flow rates significantly inhibited the growth of phytoplankton. Changes in flowing conditions caused a dramatic shift in phytoplankton species composition, from blues at still water to greens due to competition for light. Flow rate significantly enhanced inter-relationship among environmental variables, especially induced higher water turbidity, and stimulated vegetative reproduction of periphyton (Spirogyra), accompanied by the decrease of underwater light intensity, which in consequence may inhibit the photosynthetic intensity of phytoplankton. Competition for light was a key factor determining the changes in phytoplankton community structure. The findings may find useful application in water management, improving prediction of the flow rate required to inhibit phytoplankton biomass increasing and prevent surface blooms of harmful cyanobacteria.
Keywords: Environmental variables, Phytoplankton, Enclosure experiment, Flow rate

Studies on algae bloom of Xiangxi River in the Three Georges Resevroir Area based on Multiple Parameter model

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Abstract: As a result of the construction of the Three Gorges Dam, the aquatic environment was changed significantly along with the increasing of the reservoir level, palliation of flow velocity and declining of the water diffusion capacity. In this condition, algal blooms occur frequently in the Bay and stagnant water areas of the tributaries especially in Xiangxi River, which has become the prominent problems of water environment in reservoir area and the public focus, presenting a raising trend on the time, extent and frequency. Based on the analysis of algal blooms characteristics in the Three Gorges Reservoir Area, integrating the relevant monitoring data, multiple factors induced the algal blooms such as Climate, hydrology, water quality, social economic and other factors were determined. Multiple parameter model including Climate, hydrology, water quality, social economic was established by Multiple regression analysis method, Fuzzy Comprehensive Evaluation Method and Analytic Hierarchy Process (AHP), etc, which was used to study the influence of the occurring of algal blooms, providing scientific basis and technical support for the prevention and treatment in the bloom of The Three Gorges reservoir as well as water ecological security management.
Keywords: Multiple parameter model; algal blooms; Three Gorges Reservoir Region; Xiangxi River

Assessing Spatiotemporal Variability of NPP, NEP and Carbon Sinks of of North America, Europe, Australia & China in response to Global Climate Change from 1911 to 2000

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Abstract: In order to figure out changes of area and productivities of global grassland ecosystems during the past centuries, the characteristics of global grassland vegetation and their NPP from 1911 to 2000 was studied with the CSCS approach and Thornthwaite memorial model in this research. Results showed that the area of grassland increased by 3.76% from 1911 to

2000 at global scale, and a significant difference in the magnitude of area change was observed in northern and southern hemispheres. At global scale, the NPP of grassland slightly increased (3.4%) over the period from 1911 to 2000, in which NPP losses occurred in tundra & alpine steppe (3.4%) and steppe (7.6%), and NPP increases presented on savanna (6%), semi-desert (0.1%) and temperate humid grassland (4%). NPP of grassland ecosystem increased in Australia and Europe by 31.2% and 9.6%, however, decreased in North America and China by 4.2% and 0.1%, respectively. And different grassland ecosystems shows distinguished variation trend on different regions. The reasons for the shifts of natural systems are complicated, but there's no doubt that climate change, i.e. global warming, played a key role in shaping the vegetation on land, especially from global perspective.

A dye self-photosensitization photocatalytic fuel cell (DSPFC) with BiOCl/Ti photoanode

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Abstract: A dye self-photosensitization photo fuel cell (DSPFC) was proposed to degrade dye wastewater and generate electricity at the same time under visible light irradiation. The system included a BiOCl/Ti plate photoanode and a Pt cathode, and dye solutions were employed as fuel. Dyes could adsorb on the surface of BiOCl and were further degraded by dye self-photosensitization. The photo generated electrons would transfer to the Pt cathode through the external circuit due to the existing potential difference to generate electricity. 0.0052 mA·cm-2 short-circuit current density (Jsc), 0.639 V open-circuit voltage (Voc) and 24.4% Coulombic efficiency were obtained when 20 mL of 10 mg·L-1 Rhodamine B solution was used as fuel with visible light for 3 h. However the ff factor was only 0.18 and was still low for a fuel cell system. Because BiOCl itself can hardly be excited by visible light to generate electrons, the contact of BiOCl and Ti substrate increased the series resistance (Rs) and electron accumulation at the interface between the adsorbed RB and BiOCl decreased the shunt resistance (Rsh), which turned the J-V plot to a concave shape in DSPFC and caused a drastically smaller ff.

Leachate odor removal by a full-scale biofilter in a sanitary landfill site: factors and microbial characteristics

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Abstract: Leachate generated from sanitary landfill is a complex wastewater, which contains a considerable amount of organic compounds, minerals, and heavy metals. Odors, such as the malodorous and toxic hydrogen sulfide (H2S), are released during leachate collection, storage and treatment. The emission of H2S not only causes odor complaints, but it may also pose a potential health and safety risk to people living and working near the sanitary landfill. A full-scale biofilter was applied to treat H2S emitted from a leachate equalization basin in a sanitary landfill site. The aims were to: (1) monitor the performance of the biofilter with varied H2S load; (2) analyze spatial and temporal population variation in microbial communities in the biofilter; and (3) clarify the relationship between microbial characteristics and H2S removal, especially in a real application case. Results showed that the inlet concentration of H2S was 26.3-213.0 mg m-3. In steady state, total removal efficiency was over 90%. The maximum elimination capacity achieved 9.1 g m-3 h-1 at a loading rate of 10.5 g m-3 h-1. The biofilter was effective at reducing H2S. Factors on the level of H2S inlet concentration and performance of the biofilter were investigated. The H2S inlet load and removal efficiency relied on ambient and biofilter temperature, respectively. The water containing rate and relative humidity presented seasonal variation, according to which the interval period of irrigation could be optimized. The main products of H2S degradation was sulfate and sulfur also could be observed from the biofilter. Spatial and temporal shifts in bacterial community composition in the biofilter were determined by polymerase chain reaction-denaturing gradient gel electrophoresis followed by DNA sequence analysis. The

present study revealed a correlation between biofilter performance and bacterial community structure, especially in a real application case.
Keywords: biological deodorization; hydrogen sulfide; leachate equalization basin; landfill site; PCRDGE; DNA sequence analysis.

The synergistic mechanism and microbial population succession in an anaerobic methane oxidation and denitrification system

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Abstract: Methane, an even more serious greenhouse gas than carbon dioxide, could be reduced effectively via anaerobic oxidation. It can be oxidized into carbon dioxide under anaerobic condition, when oxides e.g. SO42−, Mn4+, Fe3+、NO3− act as the electron acceptors. This paper focuses on the mechanism, characteristics of methanotrophic bacteria and reaction condition of anaerobic oxidation driven by nitrate. Anaerobic sludge from sewage treatment facilities was used to screen for a microbial colony capable of anaerobic oxidation of methane. A stable biological system with the denitrifying bacteria and methanotroph co-existence were established. Methane could be oxidized to carbon dioxide and nitrate was converted into nitrogen during the synergistic reaction. Factors of methane oxidation were investigated to optimize reaction conditions. Results showed that the efficiency of methane oxidation was affected by the concentrations of substrates, DO, pH and reaction time. The highest methane oxidation capacity was 31.0 mg•g-1（TS）. The substrates, products and intermediates in the system of anaerobic methane oxidation (AMO) and denitrification were investigated to clarify the transportation and transformation of carbon-containing substances and nitrogen-containing substances. The characteristics of co-existing methanotroph and denitrifying bacteria in the same reaction system were also analyzed by cloning/sequencing methods in order to speculate on the synergistic mechanism between anaerobic methane oxidation and denitrification. The possible conversion pathway was that methane and nitrite were converted to carbon dioxide and nitrogen via production of formic acid and nitrous oxide, respectively.
Keywords: anaerobic methane oxidation; population succession; cloning/sequencing method; synergistic mechanism; pathway of AMO

Isolation, identification and biodegradation characteristics of a bifenthrin-degrading bacterium

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Abstract: Bifenthrin (BF) is a broad-spectrum and highly efficient synthetic insecticide. However, this compound is stable to light and heat, and difficult to be degraded naturally, which makes it widely remain in the environment and causes many critical environmental problems. Microbial biodegradation of pesticide residues is the main way to repair such sort of environment pollution. In this study, bacterial biodegradations of BF were investigated. A BF degrading bacterium S8, which was further identified as Acinetobacter calcoaceticus, was isolated and purified from the surface soil near the Yangzhou Pesticide Plant. At the initial BF concentration of 100 mg·L-1, the 5d-degradation rate of BF by this bacterium reached 55.2% with half lives of 60.7 h under the condition of pH7.0 and 30℃. Through the treatments of high concentration re-domestication and UV mutagenesis, the degrading activity of S8 against BF was significantly increased about 30%. BF biodegradation pathway was also preliminary deduced based on the biodegradation products analysis by GC-MS. BF might be firstly degraded by ester bond fracture and generated smaller carboxylic acid and alcohol (Lambda cyhalthrin acid and 2-Methyl-3-biphenylmethanol), and then generated other less toxic or nontoxic compounds with further oxidation, dehydrogenation, and benzene ring opening.
Keywords: Bifenthrin, bacterial biodegradation, biodegradation pathway

Preparation and Characterization of Poly-silicic-cation Coagulants with Different pH

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Abstract: A poly-silicic-cation coagulant (PSiC) with different pH was prepared from industrial wastes. The characterization of the coagulants were measured by X-ray diffraction (XRD), infrared spectra (IR), ultraviolet/visible absorption (UVA) scanning and microscopic imaging, and the coagulation performances were evaluated by papermaking wastewater treatment. The results show that pH 1.5 is the optimal preparation pH as the polymerization process, degree and form of PSiC are better than other pH. The peak intensities of Fe–O–Fe, Al–O–Al, Si–O–Fe, Si–O–Al, Fe–OH and Al–OH and contents of high polymers decrease and the cross-copolymerization of Fe(Ⅲ) and Al(Ⅲ) hydroxyl polymer is weakened when pH is too low or too high. Morphological analysis also shows that the irregular PSiC units are decrease with the increasing pH. Coagulation performances are consistent with the analysis of PSiC characteristics.
Keywords: Coagulant, poly-silicic-cation, industrial wastes, pH, papermaking wastewater

Emergency Response Platform Building for Suzhou Regional Water Supply

Shuping Li

Abstract: Regional water supply whose source is relatively concentrated, water supply area covers several regions and pipe networks are connected each other. The security of water systems has long been a concern in the water industry. The potential for natural, accidental, and purposeful contamination or other events that would hinder the ability of the system to provide a safe water supply has been the subject of many studies. Platform building is divided into two parts in the research. Firstly, the regional water supply modeling and verification, optimal layout of monitoring facilities and analysis on emergency operation in several regions are considered. Then, purchasing and developing simulation software, installing field monitoring instruments and facilities, and compiling the guidelines for emergency response platform are done. By these actions, emergency response platform of Suzhou was formed. Many potential sources are available for obtaining the data required to generate a water distribution model, and the availability of these sources varies dramatically from utility to utility. Due to the difference in the degree of information technology application between these utilities, dealing with the form of CAD, GIS and original network model was needed in the project. Processing steps include: firstly, convert CAD, GIS-formatted files to network model files. Then, technologies such as topology simplification coordinate conversion and map collection in the model files are used. The main aim of pressure monitoring is to identify the operation status of water network, so engineers can operate water supply system, monitor emergency events and realize regionalized management with data from SCADA. Layout of pressure monitoring nodes adopts the approach of optimal calculation combined with qualitative rules. Research method for the number and location of pressure monitoring nodes in the water distribution network usually use clustering analysis. On the basis of network model, evaluation index for water supply security should be introduced to understand the effect of water system breakdown on normal water supply. The reliability evaluation of water distribution network is to acquire operation reliability data based on comprehensive analysis of each key element in network system. The critical procedures are to determine nodal water availability and instantaneous reliability of water quality.

Application of AHP and Fuzzy Synthetic Evaluation for Integrated Regional Environmental Assessment---A Case Study in North Bund Shipping Service Cluster, Shanghai

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Abstract: Aim to promote the sustainable development of Shanghai North Bund Shipping Service Cluster where Shanghai shipping industry originated, a fuzzy synthetic evaluation combined with Analytic Hierarchy Process (AHP) were applied to evaluate environmental quality of this area.

The results showed that the regional environmental quality of North Bund belong to E3 level, which means that the regional environmental quality has already been affected by noise, light pollution, waste water and waste. Among with the factors mentioned above, traffic noise and surface water pollution were main factors. Both improving measures and planning strategies were put forward for remediation regional environment quality.
Keywords: Analytic Hierarchy Process (AHP); Fuzzy synthetic; North Bund Shipping Serveice Cluster; regional environmental quality assessment; development suggestion

The relationship between pre-treatment and Critical flux of Ultrafiltration for drinking water production from Taihu River

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Abstract: Due to the relevance of critical flux and membrane fouling, the critical fluxes of different pretreatment (e.g. coagulation, sedimentation, sand filtration) to Ultrafiltration for drinking water production from Taihu River were discussed. Results showed that, the critical flux of on-line coagulation+UF, sedimentation+UF, sand filtration+UF was 86.5L/m2h, 80.5L/m2h and 68.1L/m2h, respectively. Pretreatments can in various degrees alleviate the fouling by pre-reacting with the foulants in the feed water.
Keywords: Membrane fouling; Critical flux; Ultrafiltration; pre-treatment

Removal of Steroid Estrogens from Waste Activated Sludge Using Fenton Oxidation

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Abstract: Traditional sludge stabilization processes cannot remove EDCs effectively. The main objective of this work was to study the removal of four estrogens (estrone (E1), 17β-estradiol (E2), estriol (E3), and 17α-ethinylestradiol (EE2)) in waste activated sludge treated with Fenton oxidation. Response surface methodology (RSM) was used to produce regression models for all responses to navigate target compounds removal by Fenton oxidation. The degradation intermediates were detected using gas chromatography and mass spectrometry. Pregn-4-ene-3,20-dione and pregn-4-en-20-yn-3-one were observed for the first time. Fenton oxidation was here shown to offer a promising alternative method of removing EDCs from sludge in pretreatment applications.
Keywords: Endocrine disrupting compounds, Fenton oxidation, waste activated sludge, response surface methodology, degradation intermediates.

Potential Effect and Accumulation of Veterinary Antibiotics in Phragmites australis under Hydroponic Condition

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Abstract: Potential effect of veterinary antibiotics (ciprofloxacin HCl, oxytetracycline HCl and sulfamethazine) with the concentrations of 0, 0.1, 1, 10, 100 and 1000μg/L on the classic wetland plant (Phragmites australis) was evaluated by measuring root activity, and chlorophyll, superoxide dismutase, catalase and peroxidase in leaf, a study of the accumulation of antibiotics in plant was also included. Results showed that antibiotics in solution had a toxic effect on the root activity and leaf chlorophyll by high concentration (> 10μg/L). Phragmites australis could accumulate antibiotics by water transport and passive absorption, and the antibiotics content in all plants was in the sequence CIP > OTC > SM2, and the distribution of all antibiotics in plants was in the sequence root > leaf > stem.

Keywords: Constructed wetland, Phragmites australis, Antibiotics, Phytotoxicity, Uptake

Occurrence and concentrations of perfluorinated chemicals and pharmaceuticals in groundwater in Taiwan

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Abstract: To date, the occurrence of perfluorinated chemicals and pharmaceuticals have been much better characterized in surface water and wastewaters compared to groundwater. This is the first study reporting the occurrence of these chemicals in Taiwanese groundwater systems. Forty pharmaceuticals and ten perfluorinated chemicals (PFCs) were monitored in the twenty groundwater sites in Taipei and Hsinchu area. These two regions were chosen for their dense population and high-technology electronics industries. The PFC data shows that although PFOA and PFOS were most frequently found with highest concentrations in surface water, they are not necessary the ones with the highest concentrations in groundwater. PFHxA was detected at highest concentration (up to 360 ng/L) while PFOA and PFOS were detected up to 38 ng/L and 61 ng/L level. The longer the fluorinated carbon chain, the lower the average detected concentrations (PFHxA > PFOA > PFHpA > PFNA > PFDA > PFDoA), and PFDoA was not detected at all in all the water samples. Sixteen antibiotics, painkillers and psychostimulatn were also found. Sulfamethoxazole, ibuprofen, acetaminophen and caffeine were the most frequently (> 50%) identified compounds having concentrations up to 1.8, 0.8, 1.0 and 0.9 ug/L respectively.

Fluoride recovery from spent fluoride etching solution through crystallization of Na3AlF6 (synthetic cryolite)

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Abstract: CaF2 precipitation is the most frequent applied method in Taiwan to remove fluoride from wastewater of semiconductor industries. Calcium chloride and lime are used to promote precipitation of CaF2. Due to the very fine CaF2 precipitates (~0.1 sedimentation of CaF2. In turn, large amount of sludge is produced by CaF2 precipitation/sedimentation process. In this study, removal of fluoride from spent fluoride etching solution by cryolite synthesis was investigated. While cryolite crystallization happened instantaneously, experimental results showed that good control of reaction pH and Al:F molar ratio is the key to form cryolite successfully. The cryolite precipitates have particle size in the range of 3μm ~15μm and are much larger than CaF2 precipitates of 0.1 μm, resulting in rapid sedimentation. Meanwhile, cryolite crystallization produces much less sludge volume than does by CaF2 precipitation. Depending on the type of aluminum salts used, residual fluoride is in the ranges of from 140 to 380 mg/L with aluminum chloride producing the lowest residual concentration. Recovery of F by cryolite in fluidized bed crystallization reactor followed by removal of F by conventional CaF2 precipitation is investigated. The proposed process generates useful resource and produces less wasted sludge.

The USEPA Established Malibu Creek and Lagoon TMDL

Cindy Lin, Ph.D., USEPA Region IX

Abstract: USEPA established a total maximum daily load (TMDL) for Malibu Creek And Lagoon to address sedimentation and benthic macroinvertebrate community impacts. The benthic community is an indicator of water quality impairment, and reflect a stressed environment. In the Malibu Creek Watershed, USEPA identified sediment and excess nutrients as primary water quality pollutants negatively impacting the benthic community. Indictors of stressed condition include excess sediment, nutrients, and algal coverage. Other stressors, such as altered hydrology, were also identified. This assessment includes a stressor identification assessment and analysis of the critical relationship between water quality and biological indictors. This includes the results from implementing the recommended biological assessment scoring tools, such as the California Stream Condition Index. USEPA established numeric targets and waste

load and load allocations that are based on the reference conditions in the Malibu Creek Watershed.

Predominant Bacterias Isolation and Their Treatment Effeciency during Kitchen Waste Composting

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Abstract: In the study, urban kitchen waste was set as the research object, according to the change of composting temperature gradient, bacteria strains were screened from the heating, high temperature and cooling stages of the experiment. After genetic sequencing identification, two kinds of predominant bacteria were obtained at last which were respective Proteus mirabilis strain - singular Proteus strains and Bacillus methylotrophicus strain - methyl nutrition Bacillus. Then two kinds of predominant bacteria were added into the aerobic composting again with the reactor volume quantity of 1.5%, according to the different ratio of 1:1, 1:2, 2:1, 1:3, 3:1. Compared to the control test, the results showed that the composting effect of kitchen waste was the best for the ratio of 2:1, and C/N and the seeds germination rate were 4.89 and 95.9% respectively. The aerobic composting period of kitchen waste and straw was shorted at 22 days, and compared with the control test, moisture content, the organic matter and TN were reduced respectively by 1.90%, 4.27% and 11.96%. The change regularity of pH value and ammonia showed increase at first and then decrease, while the electrical conductivity was increased at first and then stabilized. These results indicate that fertilizer made by kitchen waste and straw had the stabilization of plants, and met the harmless requirements of fully maturity.
Keywords: kitchen waste; straw; aerobic composting; composting period;

Elimination of veterinary antibiotics and antibiotic resistance genes from swine wastewater in the constructed wetlands

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Abstract: This paper investigated the efficiency of constructed wetlands (CWs) at removing three common antibiotics (ciprofloxacin HCl, oxytetracycline HCl, and sulfamethazine) and tetracycline resistance (tet) genes (tetM, tetO, and tetW) from swine wastewater. The result indicated that the CW could significantly reduce the wastewater antibiotics content, and elimination rates were in the following sequence: oxytetracycline HCl > ciprofloxacin HCl > sulfamethazine. A higher concentration of antibiotics accumulated in the surface soil than in the media and vegetation, indicating that soil plays the main role in antibiotics removal from wastewater in CWs. The characteristics of the wetland medium may affect the antibiotic resistance gene removal capability of the system; the total absolute abundances of three tet genes and of 16S rRNA were reduced by about 50% in the CWs.
Keywords: Constructed wetland, Swine wastewater, Antibiotics, Antibiotic resistance genes.

Applying AQUATOX in determining the ecological risk assessment of nutrients in Baiyangdian Lake, North China

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Abstract: There is a growing interest in the application of ecological models to improve the ecological risk assessment (ERA) of chemicals. For this study, the AQUATOX model was adapted using 18 pelagic and benthic populations derived from field data obtained at Baiyangdian Lake between April 2009 and March 2010. The model was evaluated to examine its utility in assessing the ecological risk of nutrients in aquatic ecosystems. Model parameters were calibrated to simulate the complex seasonal patterns of Baiyangdian Lake biomass populations. Sensitivity analysis revealed the potential importance of indirect effects and demonstrated the vital role of parameter values in determining the biomass of each trophic level. The model

was highly sensitive to parameters related to temperature limitations and respiration rates. Moreover, it was effective in estimating risks associated with the direct toxic nutrients effects of each population and the indirect ecological effects distributed through the coupled pelagic-benthic food web. Comparison analysis determined the model could provide a good basis in ascertaining ecological protection levels of “chemicals of concern” for aquatic ecosystems. Furthermore, AQUATOX can potentially be used to provide necessary information corresponding to early warning and rapid forecasting of pollutant transport and fate in the management of chemicals that put aquatic ecosystems at risk.
Keywords: Ecological risk assessment; AQUATOX; Baiyangdian Lake; Eutrophication; pelagic-benthic food web

Influence of continuous Zn (II) on the organic degradation capability and soluble microbial
products (SMP) of activated sludge

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Abstract: This research reports the variety of organic degradation capability and soluble microbial products (SMP) generated in an activated sludge under continuous exposure to Zn (II) in a sequencing batch reactor (SBR). In 338 days of operation, the dosed Zn (II) concentration gradually increased from 50 to 100, 200, 400 to 600 and 800 mg/L. Results show that after adaptation, the activated sludge could endure 400 mg/L Zn (II) without showing evident reduction in organic degradation ability with about 92% of chemical oxygen demand (COD) removal efficiency in stable condition. However, when 600 and 800 mg/L Zn (II) were applied, the effluent water quality significantly deteriorated. Meanwhile, under increasing Zn (II) concentrations, the SMP contents in the activated sludge, together with its main biochemical constituents, first increased slightly below 400 mg/L of Zn (II), then rose sharply under 600 and 800 mg/L Zn (II). Furthermore, a close correlation was found between SMP content and effluent COD, no matter in Experimental Reactor or Control Reactor. In addition, the Zn (II) concentration in the effluent and SMP extraction liquid was further analyzed and discussed to reveal the role that SMP onstituents played in defense and resistance to the toxicity of Zn (II).
Keywords: Zinc (II); Activated sludge; Toxicity; Soluble microbial products (SMP); Organic degradation ability

The Assembly of Magnetic Metal Ozone Catalyst to Decompose Humic Acid

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Abstract: Magnetic Fe3O4/SiO2/CoOx, was synthesized by sol-gel methods as catalysts in ozonation which was indicated with the pHzpc of 1.87. Initially, this study adapted it ot decompose commercial humic acid in different pH levels, (pH 4, 7 and 10). The acidic condition was found have high decomposition rate (Kd, 0.214 S-1). The coumarin as a hydroxyl radical scavenger was investigated the contribution of direct/indirect oxidation mechanisms in deionized water by sole ozonation and catalytic ozonation in different pHs. Experimental data indicated the contribution of direct/indirect reactions were 37/63% in pH 4, 39/61%, in pH 7 and 29/71% in pH 10 by catalytic ozonation, respectively. The indirect oxidation was found to be the major reaction mechanisms in the catalytic ozonation. The catalyst ozonation reduction rates of A254 are 88.6% (pH 4), 82.6 (pH 7) and 81.8% (pH 10), which is significantly improved than that of ozone alone systems, 54% (pH 4), 75% (pH 7) and 85% (pH 10).
Keywords: NOMs, Ozonation, ORP, hydroxyl radicals, catalytic ozonation

Recovery of Acetic Acid from Mixed Waste Acids of Electronic Industry by Simple Distillation with Partial Neutralization Pretreatment

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Abstract: An innovative treatment process was developed to recover acetic acid from the mixed waste acids generated from etching and cleaning in electronic industry. It is a combination of partial neutralization pretreatment and simple distillation. The operational parameters were optimized by evaluating the effect of types and dosages of neutralization alkali, the distillation temperature and time, and the ratio of acetic acid (HAc) and nitric acid (HNO3) on the recovery and purity of HAc. In the partial neutralization pretreatment stage, sodium hydroxide (NaOH) at a dosage of 12.2 g in 150 mL raw mixed waste acid was found optimal. In the distillation stage, distillation at 140 ℃ for 5 hours was found optimal. Under these optimal conditions, >99% of HNO3, H3PO4, HF, HCl were converted to their corresponding salts, and >94% HAc recovery was achieved with a purity of 99.4% in the distillate.
Keywords: Partial Neutralization Pretreatment (PNP), Distillation, Acetic Acid, Electronic Industry, Mixed Waste Acids

Enzymatic Degradation of Pharmaceutical Contaminants in Water by a Hollow Fiber Membrane Module

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Abstract: Laccase is a well-known nonspecific enzyme and has been found to be effective in degrading a variety of contaminants in wastewater treatment systems. Since laccase is an inexpensive enzyme, it thus has the potential to be used for water treatment, where enzyme immobolization becomes a necessity. The objective of this study aims at understanding the performance of laccase that is immobilized in a hollow fiber membrane module for the degradation of pharmaceutical contaminants, exemplified by ibuprofen and naproxen. A lab-scale hollow fiber module with a membrane pore-size of 30 kDa was used for this study. The module was operated under countercurrent flows of laccase solution and the contaminant solution. Results indicate that naproxen was more degradable than ibuprofen. A maximum degradation efficiency of 30% can be achieved for naproxen and less than 10% for ibuprofen when using laccase alone as the oxidant. However, when the mediator ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) was added to assist the oxidative degradation, a maximum efficiency of 80% can be achieved for naproxen and 40% for ibuprofen. Finally, effects of system parameters such as laccase flowrate, laccase concentration, and solution pH on the efficiency of degradation were also examined. In summary, the method of immobilization for laccase tested in this study is proved to be a viable option in future water reclamation processes for the removal of emerging contaminants.

Evaluation of the improved anaerobic baffle reactor performance during start-up operation
treating cyanobacteria

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Abstract: The start-up tests and micro-ecological conditions of treating cyanobacteria in Taihu Lake by a anaerobic baffled reactor (ABR) filled with soft filler have been studied. The results presented that under the following conditions of dosing seed sludge, continuous operation with improving the load by steps, after 40 days the algae could be successfully processed. In the process of start-up, the COD(chemical oxygen demand) removing rate by was about 75%, and the gas production rate was about 65.9mL/L.d. In addition, the reduction rate of microcystins reached 90%. The soft filler played a key role in treating cyanobacteria successfully by the improved anaerobic baffle reactor. It was found that the soft filler had function on forming biofilm and training granular sludge in the reactor. In addition, it is benefit to promote the more

reasonable space distribution of the microbial communities in the compartments. Protease content of granular sludge in ABR was decreased while coenzyme F420 content progressively was increased along separation chambers. It was consistent with the quantity of archaea and bacteria along separation chambers in the reactor.
27
Keywords：anaerobic baffle reactor; cyanobacteria ; start-up; microbial community structure

Nitrogen and phosphorus removal behaviors in the new anaerobic-anoxic/nitrifying/induced crystallization process

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Abstract: The new anaerobic-anoxic/nitrifying/induced crystallization (A2N-IC) process was developed from anaerobic-anoxic/nitrifying (A2N) two-sludge process, with incorporation of the chemical crystallization phosphorus recovery system for wastewater nutrient removal. In this novel process, nitrogen and phosphorus removal performances were investigated under the different influent wastewater compositions. The results indicated that ammonia and phosphorus removal rates were both very stable in A2N-IC process. Nitrogen removal rates were maintained above 80%. The effluent phosphorus concentrations always met the Chinese National Class I grade A (below 0.5 mg/L) Sewage Discharge Standard. The incorporation of chemical induced crystallization not only reduced the phosphorus loading for the biological system but also made the electron acceptors relatively sufficient. Moreover, the induced crystallization product of phosphorus recovery was obtained. The interactions between chemical phosphorus removal and biological phosphorus removal in the A2N-IC process were analyzed. The two important parts in the system (the chemical phosphorus removal section and the biological phosphorus removal section) were both cooperators and competitors.
Keywords: denitrifying phosphorus removal; induced crystallization; nutrient removal; phosphorus recovery

Study on Water-saving of Heat-transfer System in a Chemical Industrial Park

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Abstract: In recent years much attention has been paid to water saving for environmental reasons and the rising costs of fresh water and effluent treatment. Cooling and condensation processes are widely used in chemical industries, the study on water-saving of which has important significance in the process of chemical industrial park water management. In this paper, considering the actual situation of using water and drainage as well as water conservation requirements in a typical chemical industrial park, scenario analysis method has been used for the water-saving analysis of cooling and condensation processes and the other heat transfer processes. This method also has been utilized to forecast the application effect of corresponding technologies. Aiming at reducing the overall water consumption of a typical chemical industrial park, this paper has analyzed the application prospects of inter-plant condensation water saving technology using mathematical optimization method, which is different from inner-plant water saving analysis. Considering the economic costs of each participating company, this paper has taken into account the geographical location of different plants in the condensation water saving design. Data analysis and forecasting results show that the application of water-saving technologies in heat transfer process has obvious water-saving effect, which also has demonstration effect.
Keywords: Chemical industrial park, heat transfer, water saving

Biofuel Energy Production as Catalyst for Sustainable Agriculture in Nigeria

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Abstract: Two factors underlie the quest for biofuel energy production in Nigeria. First is the availability of vast arable agricultural land that is lying waste and largely uncultivated. The oil boom of the mid 70s upturned the country"s economy from being predominantly agrarian economy to crude oil based diseconomy. The result is the shift to oil as a major source of foreign revenue. Consequently, the share of agricultural production in total exports plummeted from over 70 per cent in 1960 to less than 2 per cent today. The abandonment of agriculture has disorientated the economy, which is far from being developed. Second is the energy crisis that hit the economy due to the mismanagement of the crude oil revenue earnings and lack of appropriate energy policy framework. The collapse of the electricity sub-sector and the prohibitive price of petrol and other domestic cooking gas and kerosene forced the authorities to seek alternative sources of cheap fuel. The result was the decision by government to give impetus to biofuel production as one alternative energy source. The development of biofuel would inevitably boost agricultural production of the main cash crops needed as raw materials in industrial biofuel production. How to rekindle interest in agriculture has for decades remained a daunting problem to government. The objective of this paper is to review the policy framework and actions already put forward for biofuel production and asses the implications of such developments on agricultural production. This is with a view to ascertaining to what extent the introduction of biofuel into the energy mix would help to revamp the dwindled agricultural economy. In making this assessment, we sought and obtained relevant information from published materials relating to the issue of concern. These were analyzed in the light of the prevailing circumstances in the country"s agricultural sector. Based on the information gathered and analyzed, we found out that embarking on biofuel as a source of energy would not only rekindle interest in farming but would boost commercial agricultural production of a variety of crops. Essentially, biofuel energy has the capacity to catalyze renewed interest in sustainable agriculture in the country. The study is significant as a source of information for policy makers in planning future line of action pertaining to sustainable agriculture. It is also useful to prospective local and foreign investors in commercial agriculture and biofuel production to counter balance the opportunities and choices available to them.
Keywords: Sustainable agriculture, Energy, Biofuel, Nigeria.

Inactivation of viruses in environmental waters by titanium dioxide coupled with solar radiation

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Abstract: Waterborne viral diseases are important burden to human society. A simple and low-cost method to inactivate viruses is needed to treat viral contamination in water for human uses. Nano-titanium dioxide (TiO2) coupled with solar radiation was investigated to inactivate viruses in different types of water matrix by spiking phage MS2 to tap water or creek water. TiO2 (0.2g/l) combined with a solar simulator at ca. 62.4- 63.2 uw/m2 energy output effectively removed 7.48 log 10 of MS2 in tap water over 6 hr"s irradiation; while only 1.56 log 10 and 1.01 log 10 was removed by solar radiation or titanium dioxide alone, respectively. By comparison, removal of 4.95 log 10 of MS2 was observed in creek water under the same condition. NaCl and natural organic matters (NOM) contributed to the reduction of viral removal rate. With the increase of NaCl concentration from 0 to 70 mg/L, MS2 removal rate decreased from 4.5 log 10 to 2.0 log 10. When the NOM concentration reached 8mg/L, the removal deceased drastically to 1.52 log 10. However, little effect of NOM on MS2 removal was found when the NOM concentration is below 4mg/L.

Strategic study on pollution control and restoration of Tangxi River, Hefei City

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Abstract: Based on the aquatic environmental characteristics of new lakefront area of Hefei City, a strategic plan consisting of river channel regulation, water pollution control, water resources supplement, ecological restoration and monitoring-regulation system was proposed to restore and improve the water environment of this area. River channel regulation, including waterway dredging, shore line reconstruction, water impounding projects, pump-gateway adjustment etc.,

can transform the rain-sourced river with a single function of flood control to a landscape river of multi- function, simultaneously fulfilling the ahundred-year flood control standard. Water pollution control consists of tertiary treatment of wastewater, rainwater primary treatment and non-point pollution control. While water resource supplement can maintain the ecological services of the healthy riverine ecosystem, and improve the self-purification capacity of the river. Furthermore, ecological restoration via engineering measures can rehabilitate natural environment, maintain the long-term beneficial development of aquatic ecosystem. Finally, the monitoring-regulation system aims to uniformly manage the rainwater runoff, pump-gateways, wastewater treatment plants, water supplement projects and pipe lines.
Keywords: urban rivers; Tangxi River; water pollution; ecological restoration

Construction and Performance Studies of a Microbial Fuel Cell Based on the Degradation of Organic Pollutants by Cyanobacteria with the Novel Redox Mediator

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Abstract: Microorganism is widely used in the degradation of organic wastewater. However, due to the low oxidation-reduction potential of the azo dyes, microorganism cannot degrade azo dyes efficiently. On the other hand, the energy which produced by the degradation of pollutants is not utilized. Therefore, a new microbial fuel cell (MFC) system using a novel riboflavinyl-sulfosalicylic acid-carboxylate ester-iron (Ⅱ) complex (RF-SA-Fe) as a redox mediator was reported. In order to absorb the RF-SA-Fe, the vitreous carbon electrode was modified by chitosan. The structure of the RF-SA-Fe was analyzed by Fourier transform infrared (FTIR) spectroscopy. The activity and selectivity of the redox catalysts of the electrochemical properties was investigated by the HMDE and cyclic voltammetry method. Due to the presence of the ligand Fe (Ⅱ), the RF-SA-Fe has a larger steric hindrance. Compared with the traditional redox mediators such as riboflavin (RF) or anthraquinone-2-sulfonate (AQS), the novel redox mediator is more stable in solutions or illumination and it cannot easily be degraded by microorganism. Because of the strongly hydrophilic, the RF-SA-Fe has higher decolorization efficiency than traditional redox mediators. It also has a higher electron transfer rate than RF and AQS. Under illumination aerobiosis, the system of Dactylococcopsis acicularis - Redox mediator degraded up to 150mg/L Orange Ⅱ within 48h and in this process the power density is remain stable. MFC represent a new method for producing electricity from the oxidation of organic matter. It"s economical and efficient to realize contaminant reduction.
Keywords: Redox Mediators; Azo Dyes; Microbial fuel cell; Riboflavin; Catalyst

Development and Implementation of Waste-to-Resources Supply Chain Exemplified by Yong- An Industrial Park

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Abstract: To protect the environment, ecology, and social justice as well as enhance economic development and promote green technology, the Taiwanese government promulgated the “21st Century Agenda - The Sustainable Development Strategy Outline of the Republic of China” to provide guidelines in moving the plan towards sustainability. The Sustainable Development Strategy Outline includes the visions of sustainable environment, sustainable society, and sustainable economics, where establishment of ecological preservation areas and promotion of eco-industrial parks are two important strategies of the environmental planning policy. In this study, integration of the waste-to-resource (WTR) supply chain in the Yong-An Industrial Park of

Taiwan was constructed for improving the economic and environmental benefits of manufacturers. In addition, the material flow and energy flow analyses were provided to assess the potency for achieving the objectives of wastes recycle and reuse in this Industrial Park. The major industries in the Yong-An Industrial Park are metallic and metallurgical industries, chemical manufactories, and metal product manufactories. Meanwhile, the major wastes generated from the above industries include steam, waste glass mixture, organic/inorganic sludge, and fly ash, nonhazardous organic solvent, with a total amount of 502,438 ton per year. Currently, in addition, Yong-An Industrial Park is constructing up a new business model to utilize the Palm Kernel Shell as the green fuel pellet in boiler for integration of energy supply system. It was expected that the number of the small-scale boiler with low energy efficiency and high pollutant emission should be reduced gradually due to the utilization of combined heat and power (CHP) technologies in the integrated energy supply system. As a result, high quality steam with a reasonable price could be provided to the demand site. By the end of December in 2012, totally 9 of supply-demand chains were achieved in the Yong-An Industrial Park. With this successful experience, the amounts of steam supplied in this model were estimated to be 370,000 ton per year, corresponding to CO2 emission reduction of 73,000 ton by 2012. In addition, the amount of waste-to-energy and recycling wastes were estimated as 1,703,000 ton per year, equivalent to a CO2 emission reduction of 240,000 ton per year. As a result, the economic benefit is estimated to be NTD 18.6 billion per year. It was thus concluded that the win-win benefits in both environmental and economic aspects would be achieved by implementing the “Waste-to-Resources Supply Chain” in Yong-An Industrial Park.

Keywords: wastes steam; waste sludge; CO2 reduction; sustainable development; symbiotic resourcerecycling networks

Southern California Bight Regional Monitoring Program – Orange County Perspective

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Abstract: More than $30M is spent annually on environmental monitoring to assess environmental conditions of the Southern California Bight, an important resource for biodiversity, fisheries, migratory birds, endangered species, as well as ecotourism. Despite this large expenditure, only 5% of the Bight is routinely monitored for different parameters using various methods, making it difficult to discern regional pattern and historical trends. The Southern California Bight Regional Monitoring Program is an integrated, multi-disciplinary and multiagency study that provides a unique platform for collecting data for Bight-wide perspectives. The Program is a partnership of more than 60 organizations collaborating to address management questions of regional importance in the Bight offshore, nearshore and estuarine habitats. The program lead is Southern California Coastal Water Research Project (SCCWRP), a joint power agency focused on environmental research. The Program was initiated in 1994 and was repeated in 1998, 2003, 2008, and 2013. “Core” components of Bight surveys include: 1) contaminant impact assessment; 2) shoreline microbiology; 3. marine trash; 4. coastal eutrophication. Survey for each component is guided by several research questions including those about the distribution, magnitude, trends, and other issues of special concern. These core components are then supplemented by a number of special studies. With financial and in-kind assistance from all participants, SCCWRP coordinates all activities including study design, sampling coordination, QAQC, and report writing. Orange County Watersheds Program, the guardian of surface water quality in Orange County and member agency of SCCWRP, recognizes the value of the regional coordination and has actively participated in all Bight surveys. Through this participation, regional context and significance are provided for the otherwise routine and fragmented monitoring efforts associated with National Pollutant Discharge Elimination System and Total Maximum Daily Loads, making them more targeted and coordinated. Working with Bight Program has also benefited other programs such as Regional Harbor Monitoring Program and Toxicity Reduction and Investigation Program.

The performance enhancements of aerobic granular sludge (AGS) reactors for perspective
practical application

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Abstract: Aerobic granulation receives great interests of researchers engaging in a quest for an efficient and innovative technology in wastewater treatment, due to the feature and excellent performance of aerobic granular sludge(AGS), such as its high loading capacity, low sludge production, good settling properties, long biological residence time, multiple biological effects, high resistance to toxicity, etc.. Extensive research work on aerobic granulation has been reported based on sequencing batch reactor, such as SBR, SBAR. However, there are still unresolved issues inhibiting the practical application of this technology, and the continuous-flow AGS reactors are hardly investigated. The authors try to dissect the factors and conditions needed during start-up and operation of AGS rectors, based on practical experience and a large number of studies in the literatures, presenting an up-to-date review on the performance enhancements of AGS reactors over the last decade. The important aspects of this article are: (i) countermeasures enhancing the start-up and granulation in AGS reactors, (ii) strategies optimizing operation parameters for long term stability of operation, and (iii) means improving the removal efficiencies of the organic matter, and nutrients in the final effluent. Finally the authors have highlighted future research direction of continuous-flow reactors based on their critical analysis.

- **Evaluation of the process imbalance in anaerobic digestion of food waste**

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Abstract: Process control strategy is of critical importance which could provent process imbalance in the anaerobic digestion of food waste. The aim of this work is to determine a reliable parameter which could be used as an indicator of process imbalance during anaerobic digestion of FW in an anaerobic CSTR. In this present paper, a laboratory-scale experiment was performed for anaerobic digestion of food waste characterized by a high content of protein and fat. The experiment was operated at 37℃ and under a quasi-continuous condition. In the whole experiment, parameters like biogas production rate and pH values were monitored on-line, while parameters including methane content and VFAs were measured off-line. The experiment results revealed that a decrease of biogas production and methane yield was usually accompanied by an accumulation of VFAs such as acetate, propionate, butyrate, isobutyrate, and valerate. Also, significant amounts of butyrate, isobutyrate, and valerate were accumulated in the bioreactor when the concentrations of acetate and propionate were very high. It could be concluded from the results that, any one single parameter including biogas production, methane content, pH and propionate:acetate ratio could not be used as a reliable indicator for monitoring the process imbalance in anaerobic digestion of food waste. In addition to VFAs concentration, the variation of VFAs compositions has been found to be the key indicator for monitoring the process imbalance during anaerobic digestion of food waste especially in the early-stage digestion. The concentration levels of acetate，propionate，Nbutyrate, isobutyrate, isovalerate can be used as effective parameters for indicating the process imbalances in anaerobic digestion of food waste.
Keywords: food waste, anaerobic digestion，process imbalance，indicator

- **Effect of Climate Change on Cyanobacteria Bloom in Lake Taihu**

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Abstract: Lake Taihu, which is the third largest lake in China, is a typical shallow lake (mean depth: 1.9 m) situated downstream of the Yangtze River Catchment in southeastern China. The region in which the lake is located is the most industrialized area in China and has a high population density, and high rates of urbanization and economic development. Because of the nutrient inflow from the basin, the lake has suffered from eutrophication since the 1980s, and Cyanobacteria blooms that have occurred each summer have caused damage to the tourism and fishery industries as well as utilization of water resources. The water pollution of Taihu Lake is

characterized by the severity of eutrophication and high frequency of algae bloom. In order to assess the effect of climate change on the algae bloom in Lake Taihu, the air temperature and wind speed were carefully studied in 1961-2007. The Cyanobacteria blooms usually with high air temperature (AT) and low wind speed (WS). So, the days with high air temperature and low wind speed were pick up when the value of AT>25 degree and WS<4 m/s at 2:00 pm in 1961-2007. The results show that the days averaged in each year in the 47 years are 46.98 days but it increased obviously from 1961 to 2007. The days with above criteria appeared much earlier in recent years. In 1980s it was usually first appeared in May or June but in 2007 with a heavy bloom in the lake, it was first appeared in March. The results show that climate change affects Cyanobacteria bloom lot. Associated with the National Key Basic Research Program (973 program) "Studies on the process of large and medium shallow lake eutrophication and the mechanism of the algae bloom", algae biomass and concentration of nutrients have been monthly measured in the lake since 2009. Hydrological and meteorological parameters have been continuously monitored as well. The measurements in the past three years showed that nutrients inflow from the basin were the most important factor to control the algae bloom within one year. For example, the 2011 was extreme year with a big drought in spring. From January to May, the rainfall in the basin was only 179 mm in 2011, and it was 393 mm in 2009 and 510 mm in 2010. So the non-point pollutants inflow to the lake decreased lot in the year and results in the Cyanobacteria bloom appeared later in the spring and area of coverage were rather small in the whole year compared with what in 2009 and 2010. The numerical simulations are carrying out to study how algae bloom response to the nutrients load inflow from the basin and the main climate factors.

Keywords: Cyanobacteria bloom, Lake Taihu, Climate change

Residues and Risk Assessment of Typical Persistent Organic Pollutants in Dianshan Lake, Shanghai

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Abstract: Dianshan Lake located in south-west of Shanghai, China, is the largest freshwater lake and one of the main water source conservation areas of the city. Because of the rapid industrial and agricultural development in recent decades, the water quality of this lake has declined. In order to understand the persistent organic pollutants (POPs) pollution status and provide scientific basis in making water quality regulation in the future, the level of selected organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs) in the water and surface sediments from Dianshan Lake were investigated and the ecological and health risk was also conducted. Results showed DDTs, HCHs and HCB were the predominant pollutants in almost all the samples. Although the residue levels and relevant risk of OCPs and PCBs in sediment and water from Dianshan Lake were low, however, considering the important function of Dianshan Lake as water resource conservation area and the bioaccumulation property of POPs, the contamination of POPs in Dianshan Lake should not be overlooked.

Keywords: Water resource conservation; POPs; sediment; risk assessment

A self-contained, PV-powered domestic toilet and waste water disinfection system

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Abstract: A comprehensive design review, development, construction, and performance testing of a sustainable, traditional infrastructure- free approach to the handling and processing of human sanitary waste including human fecal solids control, urine processing, and liquid wastewater treatment. The treatment scheme incorporates sludge disinfection, treatment, and volume reduction. This solar toilet system has at its core unit process photovoltaic- powered (PV) electrochemical chemical reactors that generate H2 as a potentially useful byproduct obtained during anoxic wastewater and fecal matter treatment including the complete disinfection of the total cultural bacteria initially present. The system has been designed to be free of an electrical grid or from subsurface urban infrastructure. Our prototype treatment scheme can be adapted for

single family use as a sanitary toilet facility or upon scale- up, the design can be enlarged in size to handle the daily wastes of 500 people with a predicted break- even operating cost when powered by a PV array in which energy is stored for use throughout 24 hours of continuous operation. The fundamental concept has been tested at the bench- scale and also at the prototype scale with synthetic feces, with urine, with domestic wastewater, and with human feces. Based on both our bench- top laboratory experiments and on our larger- scale reactor systems (20 L and 40L process volumes), and in the prototype unit testing unit. Our general concept, specific design elements, and treatment approach has proven to be viable for the treatment of raw domestic wastewater, human urine, human feces, and synthetic human waste analogues. After several hours of PV- powered electrochemical treatment, the turbid, black water influent can be clarified with the elimination of the suspended particles along with the reduction or total elimination of the chemical oxygen demand (COD), total enteric coliform disinfection via in situ reactive chlorine species generation, and the elimination of measurable protein after 3 to 4 hours of PV- powered treatment.
Keywords: Self-contain, PV-power, electrochemical, sodium chloride, disinfection, toilet

Sustainable Strategy for Urban Water Resource and Environment

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Abstract: Abstract Water problem has become one of the top six well-accepted key scientific problems worldwide affecting human quality survival in the 21st century. To solve this problem, two main conceptions are proposed. One is to improve urban water resource and environment (UWRE). The other is to construct nonconventional water resource utilization mode (NWRUM). For UWRE improvement, opening up the source and regulating the flow from time to time, with wastewater resourcefulization at the meantime, are vital. As for NWRUM, scientific management plays an important role. Strict regulation and multi-scale utilization such as energy recovery and heat cascade utilization, are considered the most effective strategy. Case study was also analyzed and discussed in detail.
Keywords: water resource; environment; sustainable; strategy

The Simulation, Verification and Optimization of the Sedimentation Tank of a High-efficient Device for Treating Stormwater Overflows

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Abstract: Stormwater overflow with the numerous contaminations - especially the Suspended Solids (SS) may result in eutrophication and have negative effects to potable water safety. The quality and quantity of stormwater overflows may various greatly in different rainfall processes and give high impact to wastewater treatment plants. In recent years, severe rainstorms have happened frequently in different cities in China, so the pollution caused by stormwater overflows is drawing increasing attention. A high efficient device was developed for treating stormwater overflows, and the hydraulic surface loading of its sedimentation tank was ten times more than that of a normal sedimentation tank. With the adoption of the two-dimensional, steady, k–ε turbulent model, the flow field in the sedimentation tank of the device was simulated by employing Computational Fluid Dynamics technique. The velocity distribution was found to be disordered, and several hydraulic dead zones were existed in the sedimentation tank. The simulation results were verified by an Acoustic Doppler Velocimeter. The simulation results and actual measured results fitted well, the errors of most measure points" velocities were no higher than 35%, which indicated that the simulation results reflected the actual velocity distribution well. Accordingly, an optimization program was proposed: adding a baffle. After that, the flow conditions in the sedimentation tank were improved obviously.
Keywords: stormwater overflows, Computational Fluid Dynamics, Acoustic Doppler Velocimeter, simulation, optimization

Analysis on Organochlorine Pesticides Residue in Soils of Jianghan Plain, China

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Abstract: According to the subarea investigations of Organochlorine pesticides (OCPs) in the Jianhan Plains, the HCHs and DDTs in soils may be derived from the use of pesticide in industrial emissions in history. The HCHs content with background district (＜50ng/g) for main fact, accounts for 97%, the residue area (> 50ng/g) of DDTs accounts for 50%. The residue amount of HCHs and DDTs are the highest among vegetables place - cotton field of riverine high area, and the lowest in nonirrigated farmland - forest orchard ground. It is 0-50cm and 5-50cm to collect the depth richly respectively, but no matter which kind of depth, the relation of concentrations value, are β-HCH＞α-HCH＞δ-HCH＞γ-HCH, and pp-DDE＞op-DDT＞pp-DDD＞pp-DDT, to different isomers of HCHs and DDTs respectively. The HCHs residue amount is higher than DDTs in the crops generally. The rich collection intensity of different crops is vegetables >rice >cole > wheat> cotton, successively. The OCPs are detected highly in crops products, but most of them are lower than Pollutant Limit in the crops products of the Agriculture, Domestic animal, Aquatic Products Pollution Monitoring Technical Specification (NY/398-2000).
Keywords: Organchlorine pesticides; Accumulate mechanism; Transplant; Biology cumulative effects; Jianghan Plain

Influence of Fe2+-sodium persulfate on extracellular polymeric substances and dewaterability of sewage sludge

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Abstract: As activated sludge process is widely used in municipal and industrial wastewater treatment, a large amount of waste activated sludge is being generated from such process needs to be treated or disposed of. Dewatering is one of the most challenging operations in sludge treatment. Although Fenton and Fenton-like processes have high dewatering potentials, their application has been limited by factors including long treatment time and complexity of implementation. Persulfate is a strong and non-selective oxidant with a high redox potential of 2.01 V. It can be effectively activated by initiators, including heat, UV light, or transition metals to generate sulfate free radicals (Eo = 2.6 V), which can react with a wide range of environmental contaminants. Activated persulfate generated from Fe2+-sodium persulfate (SPS) was used as a conditioner for dewatering of waste activated sludge. The effectiveness of Fe2+-activated persulfate in improving sludge dewaterability, which was evaluated by the specific resistance to filtration (SRF) and the capillary suction time (CST). With the dosages of Fe2+ 30 mg/g DS (dry solids) and SPS 100 mg/g DS, the SRF and CST reductions achieved 89.0 ± 0.3% and 84.1 ± 1.3%, respectively. Furthermore, the dewatered cake moisture content was as low as 52.6 ± 2.4% at such dosages in a pilot scale experiment by diaphragm filter dewatering equipment. Finally, the influence of Fe2+-activated persulfate on extracellular polymeric substances (EPS), including loosely bound EPS (LB-EPS) and tightly bound (TB-EPS), zeta potentials were determined to explore the mechanism enhancing sludge dewaterability. The proteins and polysaccharides contents in filtrate all increased with increasing the amount of Fe2+-SPS, but decreased in TB-EPS under higher dosage of Fe2+-SPS. The proteins in filtrate, LB-EPS or TB-EPS are more dominant than polysaccharides at the same Fe2+-SPS dosages.

Soil Vapor and Groundwater Remediation of Fuel Hydrocarbons - NMUSD Case Study

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Abstract: The groundwater treatment system at the Newport-Mesa Unified School District (NMUSD) facility in Costa Mesa, CA, consists of 18 on-site and 15 off-site wells, consisting of both recovery and monitoring well networks. The recovery wells bring groundwater to an on-site holding tank, where the groundwater is stored prior to being sent to a QED EZ-Stacker Model 2.6P Air Stripper and carbon treatment. The Air Stripper"s 6-tray design treats impacted

groundwater by stripping the dissolved chemicals from the water, and sending the vapors produced to the Soil-Therm unit, where the vapors are catalytically/thermally destroyed. The treated water is then pumped through a 1000-lb carbon canister, where any remaining dissolved chemicals are adsorbed onto the carbon. Finally, the water is discharged to the Orange County Sanitation District‟s (OCSD) sewer line. In 1997, a soil investigation was performed at the NMUSD facility prior to the removal of three underground fuel tanks (USTs) and two waste oil tanks. The soil investigation indicated that soils around the tanks had been contaminated with benzene, toluene, ethylbenzene, xylenes, gasoline, and methyl tert-butyl ether (MTBE). Subsequent on-site investigations, involving soil sampling and the installation of groundwater monitoring wells, were conducted to delineate the extent of contamination in the soil and groundwater. A vapor extraction system (VES) was installed at the site to remediate the contaminated soils. The VES is currently operating at the site. As part of this remedial program, numerous studies were performed. A Supplemental Off-Site Investigation Report prepared by ADvTECH Environmental, Inc. (ADvTECH) identified the extent and concentrations of contaminants of concern in the off-site area. The FS was to identify the remedial alternatives applicable to the off-site area, evaluate relevant information concerning the remedial alternatives, recommend a preferred remedial option of the site, and propose a remedial action work plan that can effectively mitigate potential risks associated with the off-site groundwater contamination. This presentation will highlight aspects of the various technologies used for the cleanup of the site. The information will span over approximately 10 years, as this site remains active.

Using sodium persulfate for the oxidation of dye wastewater treatment

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Abstract: The complex dye components with highly stable and huge molecules conducted more difficulties for dye wastewater treatment. The effluents from dyeing industries were generally high in color, COD, temperature, salinity and non-biodegradation easily resulted in the serious ecological damage by the untreated effluents. Thus, effluent standards of 550 ADMI (American Dyestuff Manufacturing Industry) were regulated by Taiwan EPA. The traditional dye wastewater treatment technologies were biological, chemical coagulation, adsorption and advanced oxidation processes (AOPs) such as hydrogen peroxide, ozone and photo-catalysts including titanium dioxide and zinc oxide. The photo-catalytic processes produced the hydroxyl free radical (OH·) with strong oxidation potential. The sulfates were catalyzed to produce the sulfate free radicals (SO42-·) which obtained more research and applications in site remediation due to more stable than hydrogen peroxide and ozone. The merit of wastewater treatment oxidation of sulfate free radicals was chemical stability, easily catalyzed by ultraviolent, high temperature and transition metals. In this study, the objective was using high temperature to catalyze the azo dye wastewater by sulfate free radicals that the parameters such as time, temperature, initial concentrations of sulfate and dye were considered. From the results, increasing time was found initially fast increase of dye removal then approaching stable. Higher temperature and initial concentrations of sulfate obtained more dye removal, however, higher initial concentrations of dye resulting lower dye removal.

Keywords: dye; wastewater treatment; high temperature; catalyze; sodium persulfate; free radical

Research Progress in the Treatment of Phthalic Acid Esters in Water Environment

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Abstract: Phthalic acid esters (PAEs) have been widely used in plasticizers and personal care products in recent years, becoming one of the most common pollutants in the environment, they have received extensive attention because of a series of endocrine disrupting activities such as the (anti) estrogenic activity, (anti) androgen activity and (anti) thyroid hormone activity. The latest removal methods of PAEs in aquatic environment were summarized on the basis of an overview of PAEs and their pollution situation in aquatic environment worldwide, the advanced oxidation

processes for the removal of PAEs and their change in endocrine disrupting effects during the processes were introduced emphatically, the important development ways for the removal of PAEs in aquatic environment were proposed.

Fate and Biodegradation of Estrogens in the Environment and Engineering Systems

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Abstract: This study focuses on biodegradation efficiencies in surface water, STPs, manure, soil and sediments, and illustrates possible pathways and mechnisms during the degradation processes. In general, half-lives of EE2 are much longer than E1 and E2. The structure of EE2 is analogue to E2 but there is an ethinyl group at one hydroxyl group containing C-atom. A cleavage of this ring is therefore difficult what makes EE2 much more recalcitrant in the environment. Thus, EE2 has a big impact on the estrogenic potential although the secreted amount is much smaller than that of E2 or E1.Various kinds of bacteria and fungus, Cornybacterium spp., Nitrosomonas europaea etc., are reported to possess the ability to degrade estrogens. Moreover, reports indicate that temperature, pH values, etc. can exert impacts on degradation to different extents. The biodegradation in the sludge phase was assumed by many researchers following a pseudo-first-order reaction, and the sequence of K-values is E2＞E1>>EE2 for the same sludge. As for the pathways, it was found that E2 is oxidised to E1 in the first step. The half live of this step is around 4 to 12 hours in aerobic water and soil. However, this step does not significantly reduce the estrogenic potential. Further degradation of E1 needs the cleavage of one ring. Therefore, half-lives of E1 are significantly higher and observed E1 concentrations are normally higher than E2 concentrations. However, pathways of EE2 are still controversial, as several incompatible theories have been proposed.

Keywords: estrogen, biodegradation, endocrine disruption, half-life, wastewater

Electrochemical recovery of gallium using deep eutectic solvents

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Abstract: GaAs is a useful semiconductor material in light-emitting diodes, integrated circuits, microwave devices and solar cells. Thus, recovery of the valuable rare metals such as Ga from GaAs wastes is of great importance. A deep eutectic solvent (DES) containing the chloride/urea ratio of 1/2 has a wide electrochemical potential for reducing Ga(III) to Ga. Moreover, the DES can also reduce formation of the hazardous AsH3 during the electrochemical process. Recovery of Ga from the electrodeposition in DES has a purity of at least 90%.

Keywords: GaAs wafer waste; electrochemistry; deep eutectic solvent, recovery

Remediation of 2,4-Dichlorophenol Contaminated Soil by ZVI/EDDS/Air System

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Abstract: 2,4-dichlorinphnol (2,4-DCP) contaminated soils were effectively remediated by ZVI/EDDS/Air (ZEA) Fenton-like system. It demonstrated that iron dosage, EDDS concentration and air rate had great influence on the degradation of 2,4-DCP in soil. When the initial conditions were 2,4-DCP 296.3 mg/kg, EDDS 0.80 mmol/L, ZVI 5 g, aeration rate 1 L/min, solid-liquid ratio 1:20, the degradation ratio of 2,4-DCP and EDDS were 93.4% and 91.4% after 2-h reaction by ZEA system, and they were removed completely after 3 h. Both the degradation of 2,4-DCP and

EDDS accord with pseudo-first-order reaction kinetics equation, and their degradation rate constants were 1.97 h-1 and 0.98 h-1.
Keywords: EDDS; Zero valent iron; Fenton-like system; Soil; Chlorophenol

Development and Field-Scale Application of Hydrogen Sulfide Removal technology from COREX Coal Gas by High Sulfur Capacity Desulfurizer

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Abstract: In this work, a field scale desulfurizing device loaded with self- made JTS-01 desulfrizer and JZC-80 adsorbent was developed and applied for the treatment of the COREX coal gas. JTS-01 desulfurizer was supported the mixed metal oxides (i.e. ferric oxides) on the surface of activated carbons. And the catalyst capacity was effectively increased by means of ultrasonic assisted impregnation. Consequently, the saturation sulfur capacity and breakthrough sulfur capacity were improved by 30.3% and 27.9%, respectively. The desulfurizing process included two parts of selective adsorption and catalytic oxidation. JZC-80 adsorbent can effectively remove the small amount of impurities such as HCl, HF, HCN and ash in the COREX coal gas, guaranteeing the constant of system pressure reduction. The JTS-01 desulfurizer and JZC-80 adsorbent were successfully utilized in the commercial facility of COREX coal gas at Baosteel. The industrial data showed that the sulfur capacity of JTS-01 desulfurizer can reach about 50.1%. In engineering application, many measures were taken for controlling the system pressure loss below to 4 kPa, in order to make sure the facility working all year around. Compared with the conventional dry desulfurization process, the developed technology has the advantages of high sulfur capacity and low pressure loss, which has been carried out for nearly 5 years at Baosteel and this could be helpful for similar plants when considering H2S removal
Keywords: hydrogen sulfide (H2S); activated carbon (AC) desulfurizer; sulfur capacity; ultrasonicassisted impregnation; pressure loss

The Impact Study of Hexavalent Chromium on the Environmental Safety of the Drinking Water Source from the Jiangsu Section of the Yangtze River Basin

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Abstract: In this paper, a health risk model was used to calculate and analyze the water quality monitoring data of the Yangtze River Basin from 2007 to 2009. The data analysis leads to a conclusion that hexavalent chromium is a major health risk factor of those drinking water sources in the Jiangsu section of the Yangtze River basin. Based on the health risk analysis, an environment strategy analysis model and the Dynamic Actor Network Analysis(DANA) software were used to study the optimal strategy on the risk management of chromium contamination of those drinking water sources in the Jiangsu Section of the Yangtze River basin.

Complete Dechlorination of 2,4-Dichlorophenol in Aqueous Solution on Pd/PPy-CTAB/Foam-Ni Composite Electrode

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Abstract: The electrochemically reductive dechlorination of 2,4-dichlorophenol (2,4-DCP) in aqueous solution on palladium/polymeric pyrrole-cetyl trimethyl ammonium bromide/foam-nickel electrode (Pd/PPy- CTAB/foam-Ni electrode) was investigated in this paper. Pd/PPy-CTAB/foam-Ni electrode was prepared and characterized by cyclic voltammetry (CV), scanning electron microscope (SEM), X-ray diffraction (XRD), Brunauer-Emmett-Teller (BET) adsorption and inductively coupled plasma-atomic emission spectroscopy (ICP-AES). The influences of some experimental factors such as the dechlorination current, dechlorination time and the initial pH on the removal efficiency and the current efficiency of 2,4-DCP dechlorination on Pd/PPy-

CTAB/foam-Ni electrode were studied. Complete removal of 2,4-DCP was achieved and the current efficiency of 47.4% could be obtained under the conditions of the initial pH of 2.2, the dechlorination current of 5 mA and the dechlorination time of 50 min when the initial 2,4-DCP concentration was 100 mg L–1. The analysis of high performance liquid chromatography (HPLC) identified that the intermediate products were 2-chlorophenol (2-CP) and 4-chlorophenol (4-CP). The final products were mainly phenol. Its further reduction product cyclohexanone was also detected. The electrocatalytic dechlorination pathways of 2,4-DCP on Pd/PPy-CTAB/foam-Ni electrode were discussed. The stability of the electrode was favorable that it could keep dechlorination efficiency at 100% after having been reused 10 times. Results revealed that the stable prepared Pd/PPy-CTAB/foam-Ni electrode presented a good application prospect in dechlorination process with high effectiveness and low cost.
Keywords: Pd/PPy- CTAB/foam-Ni electrode, 2,4-Dichlorophenol, Electrochemical dechlorination

- **Environmental Management as a part of efficient integrated ESSQ Management System**

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Abstract: This study addresses current status of ESSQ management and integration in case organisation. The idea was to benchmark maturity levels with the leading Finnish international companies. The examination has been done in compliance with applied maturity model developed by the target corporation. When examining the benchmarked companies through the ESSQ framework, we found that a similar framework cannot be found in any other company as such; instead, operations are distributed under different organisations. The ESSQ management framework was found to be new to other companies. Although many sources criticise system-based development, the results of this study indicate that it is nevertheless an efficient way to develop operations. This study also outlines general development steps or trends in Environmental Management. The traditional Environmental Management has been strongly guided by laws and regulations, which, in turn, have developed in close connection to major environmental hazards or threats. In contrast, modern Environmental Management is proactive rather than reactive. It clearly emphasises the prevention of problems and uses Environmental Management as a positive tool to communicate with the whole society.
Keywords: Management Systems, ESSQ Management, Environmental Management, ecocompetitiveness, sustainable economy, maturity model

- **Formation of carbonaceous and nitrogenous disinfection by-products during monochloramination of oxytetracycline including N-Nitrosodimethylamine**

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Abstract: Formation of typical carbonaceous and nitrogenous disinfection by-products (DBPs) during aqueous monochloramination of oxytetracycline (OTC) was investigated at 25±1 0C in this study. Impact factors including reaction time, pH, monochloramine (NH2Cl) dosages and bromide ion concentrations were examined. The results showed six DBPs including chloroform (CF), dichloroacetonitrile (DCAN), trichloronitromethane (TCNM), 1,1-dichloropropanone (1,1-DCP), 1,1,1-trichloropropanone (1,1,1-TCP), especially N-Nitrosodimethylamine (NDMA) were found. Generation of these DBPs increased over time and the maximum yields were detected as 18 μg/mg, 4.1 μg/mg, 0.8 μg/mg, 2.1 μg/mg, 0.7 μg/mg, 4.7μg/mg with initial concentrations of NH2Cl and oxytetracycline as 0.8 mmol/L and 0.02 mmol/L at pH 7, respectively. Solution pH exerted significant influence on the formation all the DBPs species. Peak yields were uniformly found at pH 7, respectively, which revealed that these DBPs are greatly favored at neutral pH. Yields of all DBPs detected including NDMA monotonically raised as monochloramin dosages

increased. Production of bromine-substituted DBPs increased accordingly when bromide ion was added. Since OTC is widely distributed in the surface waters and conversion of OTC during monochloramination resulted in formation of extreme toxic DBPs, degradation of presented OTC should be highlighted before chloramination disinfection process.
Keywords: Disinfection by-products; N-Nitrosodimethylamine (NDMA); Chloramination; Oxytetracycline (OTC)

Wastewater Management and Applications in the Los Angles Region, California, USA

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Abstract: With 11 million residents, the Los Angeles Region is the most densely populated of the nine regions managed by the California Regional Water Quality Control Board. Approximately 1,000 million gallons per day (MGD) of wastewater are produced from the industrial and commercial business and residents in this region. This wastewater receives the treatment prior to being discharged into water bodies and lands. Currently, there are 29 public-owned treatment works (POTWs) receiving 99 percents of wastewater generated in this region and producing 1,000 MGD of the secondary and tertiary treated wastewater. Approximately 120 MGD of tertiary treated wastewater produced at POTWs is recycled further for the groundwater replenishment, agriculture irrigation, golf courses and park irrigation, cooling water and boiler make-up water for industry, dust control on construction sites and highways, and different recreational purposes. Approximately one percent of wastewater is treated through the onsite wastewater treatment systems and their treated wastewater discharged via land applications. Average annual precipitation at the Los Angeles Region is highly variable and terrain-dependent, ranging from twelve inches at the ocean to about twice that in the foothills. This amount of rainfall is not enough to provide the tremendous demand of water usage in this region. Furthermore, the severe drought in the recent years have greatly increased the demands of the imported water and groundwater. However, the imported water is costly. The natural replenishment rate of groundwater is slow. Therefore, the recycled water applications are becoming a more important alternative source of the water supply and significantly reduce the demands on the precious water resources in an arid environment. The wastewater and recycled water are required to have a well-designed management plan, including state-of-the-art wastewater treatment facilities, intensive monitoring programs, strict regulations, and discharge permits. They also include coordinated efforts of the private sector, environmental groups, federal, state, city, and county governments in order to maintain and prevent a healthy living environment from the possible contaminants in the waste and recycled water.
Keywords: wastewater, and POTWs.

The Performance of UASB Operation on the Removal of COD, P and N in Swine Wastewater with Heavy Metals

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Abstract: A bench scale upflow anaerobic sludge blanket (UASB) treating swine wastewater was operated from December 26th, 2012 to evaluate the removal performance of COD, phosphorus and nitrogen in the wastewater and the influence of heavy metal accumulation on the operation. Until now, 63 days were used for debugging and another 28 days were taken for a trial operation. During the debugging period, the inflow swine wastewater was diluted in order from thin to thick gradually to meet the designed COD concentration: a COD concentration of 1500 mg/L was operated for 9 days and the one of 3000 mg/L was kept for 33 days. The original swine wastewater of COD 6000–8000 mg/L was directly used both in the rest 21 days of the debugging operation and in the trial operation. HRT was chosen respectively as 36h in treating low COD (1500–3000mg/L) inflows and 48h for the higher COD (6000–8000mg/L) ones. In the whole operation, the average pH of the effluent water was kept between 7.4 and 7.8. And the average

removal efficiency of COD, total phosphorus and nitrate-N was 70–76%, 35%–45% and 40%–60%, respectively. However, the ammonia-N got no removal, but rose by 5%–25% in average. In this process, the concentration of Cu2+, Zn2+, Cr3+ in the anaerobic sludge were all seen a constant increasing trend and were considered having an inhibiting effect on the removal performance.
Keywords: UASB; COD; P; N; heavy metal

An Overview of Surfactant Enhanced Aquifer Remediation
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Abstract: Surfactant Enhanced Aquifer Remediation (SEAR) is an innovative technology to recover dense and light nonaqueous-phase liquid (DNAPL and LNAPL) at groundwater remediation sites. SEAR can be more efficient than conventional pump-and-treat systems to achieve groundwater cleanup goals in the source zone. The application of SEAR often begins with a vigorous feasibility study of site conditions and implementability of the technology. Accurate site-specific data can be obtained from soil sampling, groundwater sampling, and previous remedial efforts. This is essential to the understanding of geology heterogeneities and LNAPL distribution at the site, which leads to a focus of remedial effort on the source zone, optimization of surfactant formulation, and optimal hydraulic control. The use of groundwater sampling, process monitoring, and bromide tracer testing during pilot study is important for optimizing full-scale system design. Full-scale system design includes injection strategy and recovery of the LNAPL and surfactant solution while maintaining hydraulic control. An ex-situ treatment system integrates unit processes for removing and concentrating contaminant, co-solvent, and surfactant. SEAR is best implemented when the water table is at or near the top of the smear zone. Past case studies indicate that SEAR was able to rapidly recover a significant amount of LNAPL as compared to conventional methods. Many factors including surfactant selection and initial LNAPL distribution will impact the ability for SEAR to meet the cleanup goals on LNAPL thickness and soil total petroleum hydrocarbons-diesel range organics (TPH-DRO) concentration.

Treatment of wastewater with high concentration of aniline and harvesting polyaniline from the water through suitable chemical oxidation process
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Abstract: Aniline is an organic compound typically used as a precursor chemical in many manufacturing processes such as pharmacy, rubber-processing, paint, pesticide, dye, fiber manufacturing, and petroleum refining. The treatment technology for aniline wastewater is emergent to protect the environment, for example, a serious water pollution accident caused by aniline leakage in Shanxi province recently has threatened the safety of drinking water. While the amount of wastewater, the concentration of aniline as well as the pH of the sewage varies in a wide range, which leads the requirement of flexible treatment methods. In other words, aniline wastewater could be a useful resource for both aniline and water. In this paper, we compared different methods for treatment of alkaline aniline wastewater and investigated the possibility of harvesting polyaniline from the wastewater by chemical of electrochemical oxidation. It was found that an advanced oxidation method can be successfully applied to the treatment of aniline wastewater and over 90% aniline can be harvested by a chemical oxidation process. The particle size of the obtained polyaniline is around 100nm, while its conductivity is about 0.1S/cm.
Keywords: wastewater, aniline, advanced oxidation, polyaniline, waste utilization

Atmospheric organic carbon and elemental carbon over East China Sea: One year observation at a downwind site of continental outflow
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Abstract: Aerosol samples integrating virtually four seasons on a remote island of East China Sea (ECS) were analyzed for organic carbon (OC) and elemental carbon (EC), aiming to understand the sources, formation mechanism of atmospheric carbonaceous aerosols and size distribution over ECS. The island is a transport path of continental aerosol outflow from East and North China, where brought large amounts of anthropogenic pollutants to the Pacific Ocean driven by East Asian Monsoon. The OC and EC showed distinct seasonal variations with a higher concentration in winter and lower in summer. OC and EC concentrations in PM2.5 ranged from 0.4-27.2μg/m3 and 0.1-5.9μg/m3, respectively, contributing 93% and 80% to their respective mass of TSP. High OC/EC ratios in summer (range: 2.2-12.2; average: 5.6±3.5) indicated prominent secondary organic carbon (SOC) formation. Atmospheric OC and EC dry deposition flux ranged from 0.01 to 1.46 mg/m2/d and from 0.003 to 0.31 mg/m2/d for fine particles(<2.5μm). Outbreaks of haze episode in autumn, winter and spring, significantly increased the deposition flux. The dry deposition of OC and EC to ECS were estimated 1.54×105 and 1.15×105 t/year, accounting for 2.1% for total OC and 15.5% for EC burial in the ECS, respectively.
Keywords: OC; EC; size distribution; dry deposition; East China Sea

Studies on preparation of REC/ZnO/TiO2 nanocomposites and its decolourization of methylene blue by photocatalysis

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Abstract: modern research shows that nano zinc oxide is found to have better photocatalysis effect than nano titanium dioxide and it is the few one of semiconductor photocatalytic materials having quantum size effect. Nano titanium dioxide has low quantum efficiency and utilization ratio of visible light, nano zinc oxide is susceptible to light corrosion, which are limiting their application. Based on excellent properties of rectorite (REC) and nano zinc oxide and nano titanium dioxide, REC/ZnO/TiO2 nanocomposites were prepared by the sol-gel method, to remove organic pollutant- Methylene Blue. Filament lamp as light source, the experimental results show that the removal rate of MB is 93.18% and the adsorption and photocatalytic effect is the best when the proportion of ZnO/REC/TiO2 is 2:1:0.08 and its dosage is 900mg/L, the initial concentration of MB is 5mg/L and the pH value is 6, reaction time is 90min. After using REC/ZnO/TiO2 nano materials five times, the removal rate of MB drop 67.80%.Xenon lamp as light source, the experimental results show that the removal rate of MB is 92.72% and the adsorption and photocatalytic effect is the best when the proportion of ZnO/REC/TiO2 is 2:1:0.067 and its dosage is 700mg/L, the initial concentration of MB is 5mg/L and the pH value is 6, reaction time is 60min. After using REC/ZnO/TiO2 nano materials five times, the removal rate of MB drop to 65.80%.The result shows that REC/ZnO/TiO2 nanocomposites prepared are recycled, and the adsorption and photocatalysis of MB conform to Langmuir-Hinshelwood (L-H) dynamics model.
Keywords: REC/ZnO/TiO2 nanocomposites; Preparation; Methylene Blue; Photocatalysis

Using Steel Slag to Remedy Heavy Metals Pollution in Marine

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Abstract: Nowadays, marine economy has entered the stage of implementation. Meanwhile, marine ecosystem protection becomes more and more important, in which heavy metals pollution

prevention is an important task at present and in the future. Therefore, exploring method of heavy metals removal has important significance for solving the problem of marine ecosystem pollution and promoting the sustainable development of marine economy. This paper analyzed the status quo of heavy metals pollution, introduced the reuse of steel slag, and investigated the effects of steel slag dosage, grain diameters and the heavy metals initial concentration on the removal efficiency of copper and lead. The result shows that steel slag dosage, grain diameters and the heavy metals initial concentration are important factors which influence removal rate; steel slag can remove copper and lead efficiently, and the best removal rate can reach 98.34%, 98.98%. Using steel slag to remedy heavy metals pollution in marine will improve the water quality and achieve the optimal use of the steel slag. Therefore, we should conduct research about using steel slag in marine engineering. It will effectively improve the Shandong Peninsula water quality and coastal ecological environment; solve the problem of heavy metal pollution in marine.
Keywords: steel slag; marine; heavy metals;

Pharmaceuticals: Photochemical Fate and Engineered Water Treatment Systems

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Abstract: The presence of pharmaceutically active compounds (pharmaceuticals) in water, from various sources, is an emerging environmental engineering issue that has raised concern among the public, scientists and engineers, and regulatory groups, because of their possible human health effects and ecological impacts, even at trace concentrations. Total pharmaceutical yearly sale is estimated to be approximately $250 billion; thus, the potential for pharmaceuticals to be a problem in waters is large and growing. This project is to provide insight into the environmental fate of selected pharmaceutical compounds with the emphasis on their sunlight induced photochemical fate in simulated and natural waters. The transformative aspect of this study is the development of methods for assessing all of the photochemical pathways that account for the fate of chemicals in natural waters, and then being able to quantitatively apportion the loss of the pharmaceuticals to the various pathways. Knowledge of the environmental fate of pharmaceuticals in natural waters is critical to eventually predicting environmental risk.

Computer-controlled Liquid-phase Microextraction Combined with Other Analytical Techniques for Environment Analysis

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Abstract: Extraction, clean-up and preconcentration of the analytes are very important procedures in trace analysis of organic pollutants in complex environment samples before instrumental analysis. Recently, the development of automated, accurate, rapid, simple, and environmental friendly sample preparation methods is one of the hot points in modern analytical chemistry. In this study, a new automated dynamic liquid-phase microextraction procedure, controlled by computer to facilitate mass transfer, was developed. Sequential microextraction operation was performed by a Kloehn VersaPump 6 (V6) syringe pump equipped with an Intellect 6-port valve. A 10-cm length of hollow fiber membrane attached to a Peek tube was connected to the Intellect valve to perform the extraction. The attached hollow fiber served as the „„holder"" and „„protector"" of the extract solvent. The valve and the syringe pump were interfaced to the PC running the LabVIEW 8.2 using standard RS232 and RS485 communication bus respectively. Different LabVIEW-based programs could be applied to various microextraction tasks by changing the program code. We have combined the computer-controlled three-phase microextraction with HPLC-MS to the determination of perfluorinated carboxylic acids in waste water, combined the automated two-phase microextraction with GC-MS to extract chlorobenzens from polluted soil samples pretreated by ultrasound-assisted water extraction. Good linearity, sensitivity and relative recoveries for each method were all obtained. The extraction of slurry and

waste water samples showed that this automated method was not only a good preconcentration technique, but also an excellent sample cleanup procedure. Accordingly, further investigations are now under the way to extend the procedure to other complex matrices.

- **Remediation of arsenic contaminated soil by in situ ferrous compound treatment**

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Abstract: The chemical stabilization of arsenic in strongly contaminated industrial field soil was investigated with ferrous sulfate as the sources of both oxidant and stabilizing reagent. The degree of arsenic immobilization was evaluated by arsenic leaching test according to the US EPA‟s Toxicity Characteristic Leaching Procedure (TCLP). It was found that the stabilization efficiency of arsenic was increased by increasing FeSO4 dosage. To achieve high stabilization efficiency of arsenic, the FeSO4 treatment allowed a wide water pH range (from pH 2 to 11), a wide liquid-to-solid (L/S) ratio range (from 0.25 to 1 L kg-1), and a short period of reaction time (1 h). When treating with FeSO4 at the Fe/As(TCLP) molar ratio of 100, natural water pH 5.7, and L/S ratio of 1 L kg-1, the As(TCLP) concentration was reduced from 3.5 mg L-1 to 0.29 mg L-1 after a reaction time of 1 h, corresponding to a stabilization efficiency of 91.7 %. The removal of arsenic in the TCLP test was attributed to the double roles of Fe2+: the oxidizing agent in the pre-oxidation of As(III) to As(V) and the solidifying agent in the subsequent stabilization/solidification stage through the formation of ferric arsenate. This treatment also avoids soil acidification without adding any buffer reagents, due to the favorable feeding mode not only achieves a uniform reaction environment at low L/S ratio, but also makes soil perform well its buffering capacity. This study will provide a fast, costless and environmental method to the in situ remediation arsenic contaminated soil.
Keywords: Arsenic; ferrous sulfate; extraction; stabilization

- **Preparation and characterization of Polyacrylonitrile/bentonite blend membrane for wastewater filtration**

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Abstract: Membrane modification has been carried out to limit membrane fouling. In this study, bentonite inorganic particles were blended with polyacrylonitrile (PAN) matrix for membrane modification via the non-solvent induced phase separation (NIPS) method. The effect of bentonite particles concentration on the membrane physicochemical characteristics was investigated. A series of tests, such as field emission scanning electron microscopy (FESEM) analysis, pure water flux, contact angle (CA), zeta potential and membrane fouling rate were used to characterize membrane performance. It was found that the addition of bentonite particles could improve the neat membrane performance. The mean pore size and surface porosity of the PAN membranes were increased under the certain amount of inorganic particles. Moreover, the addition of bentonite could improve the membrane permeability. Certain amount of bentonite additive was able to enhance the membrane surface hydrophilicity and surface charge. Additionally, the amount of 0.05 wt% was deemed to be the optimum value because of the lowest fouling rate in an membrane bioreactor (MBR). Soluble microbial products (SMP) of MBR were fractionated into four components and filtration tests indicated that the anti-fouling performance for HPI-C fraction of modified membrane was substantially enhanced due to the negatively charged surface.
Keywords: Polyacrylonitrile; Bentonite; Fouling mitigation; SMP fraction

- **Wastewater Treatment towards Environmental-footprint Reduction and Resource Capture: A Refined Assessment Framework and Case Study**

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Abstract: The wastewater treatment industry is striving for sustainability by reducing environmental consequences and enhancing resource recovery. However, the current assessment frameworks as decision support tools for the selection of wastewater treatment options focus primarily on the treatment efficiency and environmental consequences for receiving water bodies. However, these frameworks generally do not quantify the potential to convert pollutants in wastewater to recoverable resources. Therefore, an estimate framework for choices of wastewater treatment that quantifies adverse environmental effects and resource capture indices was proposed. An array of wastewater treatment options were used as case studies to demonstrate how the framework works, simultaneously, to identify optimum choices.
Keywords: wastewater treatment; assessment; environmental footprint; resource recovery

A DPSIR model combined with screening indicators for eutrophic lake ecological security assessment

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Abstract: On the basis of existing research at home and abroad, this article was about lake ecosystem, and focused on selection of indicators, then established a lake ecological security evaluation framework and methods, which were concretely used in the case of Dianchi Lake. The ecological security assessment of Dianchi Lake was divided into four modules: human influence, ecological health, ecological disaster and ecological service. This study screened indicators of four modules, and combined the “driver-pressure-state-impact-response” framework to assess ecological security of Dianchi Lake. Through collecting data of nearly 20 years in Dianchi Lake, the paper made a comparison of assessment results of the four modules and the total ecological security index between screening indicators and no screening. The results showed that screening indicators could make ecological security evaluation more reasonable by using less data.
Keywords: ecological security assessment; Dianchi Lake; screening indicators; DPSIR

Biodegradation and detoxification of endosulfan in endosulfan-contaminated soil by Alcaligenes faecalis strain JBW4

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Abstract: Endosulfan, a kind of persistent organic pollutants (POPs), is wildly used by various developing/developed nations, adversely affecting environment and the health of both humans and animals due to its toxicity. Alcaligenes faecalis strain JBW4, a strain of bacteria that is capable of degrading endosulfan, was inoculated into sterilized and natural soils spiked with endosulfan. This study was conducted to comprehensively evaluate the ability of JBW4 to degrade endosulfan in soil, including the degradation rate, the endosulfan metabolites in soils, the colonization of JBW4 in soil and the detoxification by JBW4 degradation. JBW4 degraded 75.8% and 87.0% of α-endosulfan and 58.5% and 69.5% of β-endosulfan in sterilized soils and natural soils, respectively, after 77 days. Endosulfan ether and endosulfan lactone were the major metabolites that were detected by gas chromatography-mass spectrometry (GC-MS). This result

suggested that Alcaligenes faecalis. strain JBW4 degrades endosulfan using a non-oxidative pathway in soils. The ability of strain JBW4 to colonize endosulfan-contaminated soils was confirmed by polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE). This result suggested that strain JBW4 competed with the original inhabitants in the soil to establish a balance and successfully colonize the soils. In addition, the detoxification of endosulfan by strain JBW4 was evaluated using single cell gel electrophoresis (SCGE) and by determining the soil microbial biomass carbon and enzymatic activities. The results showed that the genotoxicity and ecotoxicity of endosulfan in soil were reduced after degradation. The natural degradation of endosulfan in soil is inadequate; therefore, JBW4 shows potential for the bioremediation of industrial soils that are contaminated with endosulfan residues.
Keywords: Bacterial biodegradation; Alcaligenes faecalis; PCR-DGGE; SCGE; toxicity

Iodinated trihalomethane formation from microbially derived organic matter during the biological treatment of micro-polluted source water

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Abstract: Water sources are micro-polluted by the increasing range of anthropogenic activities around them. Disinfection byproduct (DBP) precursors in water have gradually expanded from humic acid (HA) and fulvic acid to other important sources of potential organic matter.
This study aimed to provide further insights into the effects of microbially derived organic matter as precursors on iodinated trihalomethane (I-THM) speciation and formation during the biological treatment of micro-polluted source water. The occurrence of I-THMs in drinking water treated by biological processes was investigated. The results showed for the first time that CHCl2I and CHBrCII are emerging DBPs in China. Biological pre-treatment and biological activated carbon can increase levels of microbes, which could serve as DBP precursors. Chlorination experiments with bovine serum albumin (BSA), starch, HA, deoxyribonucleic acid (DNA), and fish oil, confirmed the close correlation between the I-THM species identified during the treatment processes and those predicted from the model compounds. The effects of iodide and bromide on the I-THM speciation and formation were related to the biochemical composition of microbially derived organic precursors. Lipids produced up to 16.98 μg L-1 of CHCl2I at an initial iodide concentration of 2 mg L-1. HA and starch produced less CHCl2I at 3.88 and 3.54 μg L-1, respectively, followed by BSA (1.50 μg L-1) and DNA (1.35 μg L-1). Only fish oil produced I-THMs when iodide and bromide were both present in solution; the four other model compounds formed brominated species.
Keywords: micro-polluted source water; iodinated trihalomethane; microbially derived organic precursors, iodide; bromide

Extended Kalman filter for parameter estimation in membrane bioreactor process model using batch experimental data

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Abstract: Modeling of the biological process in membrane bioreactor is usually developed based on the activated sludge model (ASM). The ASM family (ASM1, 2, 2D, 3) is designed for conventional activated sludge (CAS) wastewater treatment system with lower and upper SRT limit of 3 and 30 days. The MBR usually features high SRT, high mixed liquor concentration. Therefore the migration of ASM developed for CAS process to MBR system usually requires the modification of the original model. In this study, a series of batch experiments were designed to calibrate the parameter values used for modeling of MBR using extended kalman filter (EKF). Compare with traditionally used curve fitting method, parameter estimated from EKF method provides for the flexibility in considering the nosy nature of acquired data and uncertainty in process model structure.
Keywords: Activated sludge model; membrane bioreactor; extended kalman filter

Treatment of chromium-containing wastewater using ferrite process under ambient temperatures

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Abstract: Chromium-containing wastewater produced from leather or electroplating industries was generally treated by the chemical reduction process ($Cr_2O_7^{2-}$ to Cr^{3+} ions using $NaHSO_3$). Then the alkaline agents (NaOH) were used to neutralize the wastewater and would produce a lot of chromic hydroxide ($Cr(OH)_3$) sludge (galvanic sludge). The chromic hydroxide ($Cr(OH)_3$) sludge was not stable when exposed to acidic condition and caused the leaching of chromium within the short time. The purpose of this study was to develop an effective resource technology (the incorporation of Cr ions into the structure of ferrites) for chromium-containing electroplating wastewater at ambient temperature. The chromium-containing electroplating wastewater is concentrated using the adequate sodium hydroxide and ferrous sulfate heptahydrate ($FeSO_4 \cdot 7H_2O$). As results, it was found that increasing the Fe^{2+}/Cr^{3+} mole ratio (from 2 to 16) would enhance the crystal stability of the ferrite products from the XRD pattern and the saturated magnetization. The SEM images indicate that particle size of ferrite products is about 200 nm. Additionally, the leaching of ferrite products meets the toxicity characteristic leaching procedure (TCLP) standards and the filtrate lies below the regulatory effluent standards.
Keywords: Ferrite process; Chromium; Wastewater; TCLP; Resource

Renewable Biofuels for Transportation: U.S. Perspectives

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Abstract: State and Federal officials have enacted legislation to establish a minimum requirement for the nation‟s fuel to be derived from alternative sources including biofuels. The state of North Carolina has targeted a 10% displacement of the liquid transportation fuel by locally grown and produced biofuels. If this biofuel supply is derived solely from corn kernels, we estimate at least 18% of North Carolina‟s farm lands will be converted to biofuel production. This new demand for corn production will not only impose an ever increased pressure on land resources and the environment, but also drive up food prices. The vegetated landscape along a highway corridor has traditionally been used as vegetative practices for erosion control and pollutant attenuation of highway runoff. Some of these land areas may be suitable for planting biofuel crops including sunflower, canola, safflower, and/or switch grass. This paper will provide an overview of the feasibility of producing biofuels from highway marginal lands including the probable yields, cost and economic data, and environmental and ecological benefits. The paper will present findings of biofuels production in selected Asian countries.

A combined system of lagoon and the constructed wetland for effectively controlling agriculture runoff pollution in Tai Lake region, China

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Abstract: Nowadays agricultural runoff has already become the most important nonpoint-source pollution in China. In this paper, a hybrid system of lagoon and the constructed wetland has been constructed through investigating the runoff pollution status of a vegetable field near Tai Lake in Jiangsu province, China during the rainy season. And the system purification efficiency has been studied in detail. The experimental results show that the TN and TP of the surface runoff in the vegetable fields vary in the range of 2.08~61.55mg/L and 0.17~11.59mg/L respectively. Their removal efficiencies are 70% and 75% separately. It indicates that the technique of the combined of lagoon and the constructed wetland is an effective way to control agriculture runoff pollution in the developing countries like China.
Keywords: agricultural runoff, lagoon, constructed wetland, nonpoint-source pollution

Groundwater pollution and remediation technologies of China

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Abstract: Groundwater is the drinking water source of 70% people in China. In 661 cities of China, the drinking water sources of more than 400 cities originate from groundwater. According to preliminary investigation results showed that groundwater in 90% city in China suffered varying degrees of organic and inorganic toxic or hazardous pollutants pollution, rendered by the expansion trend. In 118 cities of groundwater monitoring in recent years, 64% of groundwater is serious pollution, 33% of groundwater is slight pollution and 3% is clean. Chinese government will invest 50 billion RMB to control and remedy groundwater pollution. According to our research findings, groundwater pollution of China has three: heavy metals, organic contaminants and inorganic contaminants. The remediation technologies of groundwater pollution include pump-treat, permeable reactive barrier, bioremediation, multi-phase extraction technology, enhanced natural attenuation, and air sparging. In this paper, author will introduce some study cases.

Impact Of Small Amount Of Chlorine Dioxide On Chlorine Disinfection Efficiency

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Abstract: The effect of a small concentration of chlorine dioxide on chlorine disinfection efficiency was investigated by adding 0.02mg/l chlorine dioxide before or with chlorine being added, using E. coli as indictor microorganism. Negligible killing was observed under 0.02 mg/l ClO2 treatment, but cell wall permeability changed through the ONPG assay that the ONPG hydrolysis rate increased to 148.0±8.9 nmol·(min·mg cell dry w)−1 from 52.9±6.5 nmol·(min·mg cell dry w)−1. The existence of 0.02 mg/l ClO2 did a 1.7 log higher disinfection efficiency than chlorine only in the first 0.2 mg/l· min. It is also observed that sequential applying chlorine dioxide and chlorine showed an excellent efficiency than applying them as a mixture which indicated an active synergistic effect.

Identifying key parameters to a novel bio-ecological wastewater treatment process combined with A2O biofilm and hydrophyte filter bed for rural areas

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Abstract: To improve rural wastewater treatment for nutrient removal, this study presented a novel multistep bio-ecological A2O-H system for rural wastewater treatment. In this system, A2O unit was consist of large height/diameter ratio upflow anaerobic biofilm reactor (LUAB), anoxic biofilm reactor (AB) and five-step water-dropping aeration submerged biofilm reactor (WDAB), followed by hydrophyte filter bed (HFB), designed to remove nutrient as ecological unit. The performances of the A2O-H system were investigated to identify key parameters to each step for further application. The results indicated that the bio-ecological A2O-H system achieved not only high and stable pollutant removal but also cost effective operation and biogas production. In the A2O-H system, the hydraulic retention time of 72 h, 6 h and 3 h for the LUAB, AB and WDAB were recommended to increase the pollutant removal efficiencies as well as biogas produced rate. The COD, TSS and TN removed by the A2O unit in the overall removal rate were 85%, 91% and 58%, respectively. Meanwhile, around 43% for NH4+-N, 42% for TN and 64% for TP was removed by the HFB, and the suitable hydraulic load rate should be maintained at 0.3 m3/(m2·d). The effluent resulted for COD, NH4+-N, TN and TP of the A2O-H system were almost always less than the limited required by 1A in Chinese National Standard (GB18918-2002), which was the strictest discharge standard for treated wastewater into surface water. Therefore, the bio-ecological A2O-H system was a promising alternative to rural wastewater treatment in developing regions.
Keywords: rural wastewater treatment; bio-ecological A2O-H system; large height/diameter ratio upflow anaerobic reactor; water-dropping aeration; hydrophyte filter bed

Effects of Ca(II) on the performance and the membrane fouling of a submerged membrane bioreactor

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Abstract: Ca(II), commonly found in ground water, municipal wastewater and industrial wastewater, has great influence on the activated sludge and water treatment processes. According to the divalent cation bridging theory, Ca(II) plays a significant role in bridging negatively charged functional groups within extracellular polymeric substances (EPS), which contributes to aggregating and stabilizing the matrix of biopolymer and microbes, and then promotes biofloccualtion. The purpose of this study was to investigate the effects of Ca(II) on the performance and the membrane fouling of a submerged membrane bioreactor (SMBR) in an attempt to better understand the intricate interactions between calcium-induced enhanced bioflocculation, sludge characteristics, cake layer and their impact on fouling. A lab-scale SMBR for synthetic municipal wastewater treatment was run at three Ca(II) concentration levels (82 mg/L as control, 208 mg/L, and 410 mg/L). During the operation of the SMBR, trans-membrane pressure (TMP), particle size distribution (PSD), molecular weight (MW) distribution, filtration resistance and cake layer structure were measured. With higher Ca(II) concentration, sludge flocs were enlarged but the MW of EPS was reduced due to enhanced bioflocculation by neutralization and bridging of Ca(II), leading to the reduction of pore blocking but the enhancement of cake deposition. Additionally, both total resistance and cake resistance were reduced and the pore blocking was almost ignored with increasing Ca(II) concentration. In addition, the cake layer was thick, incompact and porous at the Ca(II) concentration of 410 mg/L, due to the bridging with extracellular polymeric substances (EPS) and the enhanced bioflocculation of Ca(II). It might explain why high-concentration Ca(II) caused lower total resistance but more severe membrane fouling. Thus, Ca(II) had a crucial effect on the formation and the structure of the cake layer to alter membrane fouling.
Keywords: Submerged membrane bioreactor; Ca(II); Membrane fouling; Cake layer; Pore blocking

Water pollution prevention and the initial permit allocation on main pollutants from major sectors of industries in the Hanjiang River basin ---As an example of the Xiangyang city part of the Hanjiang River basin

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Abstract: As the biggest branch of Yangtze River, the Hanjiang River exerts great impact on the economic and social development of Hubei Province in China. During recent years, with the economic development of Xiangyang city, the Hanjiang River especially the Xiangyang city part of the Hanjiang River basin has suffered serious pollution and caused more serious negative impact. The research on the water pollution prevention with emission trading is of great significant based on its efficiency. Through comparing the theoretical and empirical analysis of river emission trading situation in domestic and overseas, summing up the experience and lessons of governance for Hanjiang River basin, a new model was built up to allocate the initial permits of the main pollutants such as COD and Ammonia-N from major sectors of industries in Xiangyang city part of Hanjiang River basin. The model combines fairness with efficiency because of emphasizing the region and industry differentiations, which can provide a reference guide for the environmental management of the Hanjiang River basin.
Keywords: water pollution; Xiangyang city; Hanjiang River basin; main pollutants; initial permit allocation; major sectors of industries

Degradation of Atrazine in water by Nanoscale Zero－Valent Iron Supported on Modified Wheat Bran

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Abstract：In this study, we choose the wheat bran with good sorption capacity as a stabilizer, which modified with concentrated sulfuric acid after decolorization by NaOH. Using FeSO4·7H2O as raw material, NaBH4 as reducing agent to prepare nanoscale zero-valent iron supported on modified wheat bran（NZVI/MWB）of different iron content by liquid phase reduction method. The structure of NZVI/MWB was characterized by SEM. NZVI/MWB was used to degradate atrazine in water. Explore the effects of the iron content of treatment agent, the initial concentration and the initial pH value of atrazine in aqueous solution and the quantity of the treatment agent to the degradation rate of atrazine. The results showed that, the degradation effects of NZVI/MWB with a 10% iron mass fraction is the best. The lower the initial concentration and the initial pH value of atrazine in aqueous solution, the better the degradation effects will be. The larger quantity of the treatment agent, the better the degradation effects will be.
Keyword: atrazine; modified wheat bran; supported nanoscale zero－valent iron; liquid phase reduction; degradation

Root Acid invertases are associated with elevated shoot-to-root resource allocation of metallophyte Elsholtzia haichowensis under copper stress

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Abstract: Performance and associated carbohydrate metabolisms of roots in metallophytes are important because roots serve as the major interface between plants and heavy metal contaminated underground environments and as sink organs. Plants of two contrasting populations of Elsholtzia haichowensis, one from an ancient Cu mine (MP), the other from a non-contaminated site (NMP), were treated with Cu. MP was Cu tolerant. Cu treatment resulted in a higher root/shoot biomass ratio in MP compared to NMP and to control. Scaling exponent in root/shoot allometric function in MP was lower than NMP, also indicating MP allocating more resource to roots. More complicated root architecture was observed in MP under Cu stress. Four full-length cDNAs (EhNcwINV, EhCcwINV, EhNvINV, and EhCvINV) encoding cell wall bound and vacuolar invertases were cloned from roots. Both of their transcript and activity were elevated by Cu treatment in MP. There were positive correlations between root acid invertase transcript, activity and root/shoot biomass ratio. The results indicated an important role of acid invertases in governing root growth, biomass allocation and architecture in MP. They also suggested that while the tolerance mechanisms protect acid invertases from Cu damage, acid invertases in turn provide energy and carbon for maintaining the tolerance mechanisms.

Treatment of High Levels of Chlorinated Solvents in Soil Vapor Using C3 Technology

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Abstract: Background/Objectives: A subsurface investigation and a soil vapor extraction (SVE) pilot test were conducted under the guidance of California Department of Toxic Substances Control (DTSC) through the Orphan Site Fund program at an industrial site with a history of volatile organic compounds (VOCs) use located in Southern California. A Triad approach was successfully implemented during the subsurface investigation which revealed high concentrations of VOCs in soil vapor samples, including tetrachloroethene (PCE) up to 52,000 micrograms per liter (µg/L), trichloroethene (TCE) up to 12,000 µg/L, 1,1-dichloroethene (1,1-DCE) up to 33,000 µg/L, and 1,1,1-trichloroethane (TCA) up to 6,100 µg/L. Subsurface investigation also identified two zones of relatively high-permeability sediments at depths of 10 to 44 feet and 64 to 120 feet, separated by low-permeability sediments at depths 44 to 64 feet. Groundwater was encountered at a depth of approximately 115 feet. Following the site investigation, a SVE pilot test was conducted to evaluate the effectiveness of SVE for removing chlorinated solvents from the un-saturated soil and soil vapor. Approach/Activities. Based on the subsurface investigation results and urgency of VOC source removal, soil vapor extraction coupled with cryogenic-compression and condensation (C3 Technology) for treatment of the soil vapor was designed and

used to evaluate the removal efficiency of high levels of VOCs in soil vapor. The C3 Technology system rapidly and efficiently recovers VOCs from the off-gas vapor stream of the SVE system without diluting the influent stream. VOCs are condensed and recovered by the system as a liquid phase product. One shallow well and one deep well were installed with screen intervals set at depths of 15 to 44 feet and 55 to 100 feet, respectively, to target SVE at the two zones of relatively high-permeability sediments. A SVE system (C3-200) consisting of two blower skids, two compressor skids, and one chemical recovery unit, was used to extract and treat soil vapor at the site. A 55-gallon granular activated carbon (GAC) vessel was used to polish treated soil vapor. Each SVE skid included a blower capable of extracting up to 100 standard cubic feet per minute (scfm) of vapor flow and up to 12 inches of mercury vacuum. The C3-200 system operated under a various locations permit issued by the South Coast Air Quality Management District. The SVE pilot test was performed between February 15 and May 31, 2011. Results/Lessons Learned. During the three-and-half-months pilot test, approximately 1,485 gallons of liquid phase product were recovered. Laboratory analytical results and field observation indicated phase separation in the product tanks. Based on the hours of operation, inlet VOC concentrations determined by laboratory analysis, and vapor flow rates, it was estimated that approximately 4,500 pounds of VOCs were recovered. The average daily VOC mass recovered was approximately 52 pounds per day. VOC concentrations in extracted vapors decreased by up to two orders of magnitude based on test results of the SVE wells. Following the successful pilot test, eleven additional SVE wells were installed and a 500 scfm C3 unit was used to extract and treat soil vapor in a bigger area of the site. During the 24-month operation of the SVE treatment system, a total of 10,000 gallons of liquid product containing high concentration of VOCs have been successfully extracted and recovered by the C3 Technology at the site.

一种对地下水进行多层精确监测的监测系统的介绍和工程应用

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论文摘要：大量的研究和野外调查表明，地下水中的污染物通常在垂直方向的分布非常复杂。在垂直方向很窄的区域内，污染物浓度可能相差巨大。造成这种垂直方向浓度差异的原因包括污染物源头分布在垂直方向的变化和土壤的异质性等。传统的地下水监测井，通常具有较长的井屏。通过传统监测井采得的地下水样品，是井屏所包含的多层地下水的混合样品，从而无法有效地监测地下水中污染物在垂直方向的分布，也不能精确的确定浓度最高的污染区域在垂直方向的位置。后者是制定有效的地下水修复方案所必需的信息。为了克服传统监测系统的不足，一种对地下水进行多层精确监测的监测系统被加拿大滑铁卢大学的研究
人员开发出来，并且得到广泛的工程应用。该系统可以在一口单一的监测井内，提供多达七个，布设在不同深度的采样点。通过这种监测系统，可以采集七个不同深度含水层内的地下水水样和水位高度信息，达到对地下水的精确监测。这种监测系统的关键组成部分是，连续的并且内部被分隔成个七个独立空间的管(Continuous Multichannel TubingTM或者CMT管)。CMT管由高密度聚乙烯做成，直径为4.1厘米，内部被分隔成六个处于外围的饼状(直径约1.3厘米)和一个处于中心位置的六边形(直径约1.0厘米)的独立管。在建造监测井时，根据目标含水层的深度，在CMT管的不同深度设置大约18厘米长的井屏。这样，每一个独立的管就可以监测不同深度含水层内的地下水。
该地下水监测系统由于其独特的设计，可以在单一的监测井内，监测多个含水层的水质和水位高度，具有成本低、效果好、稳定性好等优点，在欧美国家地下水监测和污染场地修复等方面得到广泛的应用。作者将结合本人主持和参与过的污染场地调查和修复工程案例，介绍该系统设计、安装、和使用等方面的问题和经验。

关键词：地下水，监测，修复，工程应用

Research on Ecological Health Risk Assessment and Prediction of Hydro-fluctuation Belt in
the Three Gorges Reservoir Region

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Abstract: The Three Gorges Reservior project adopts the scheme of storing fresh water and excluding the muddy water. The floodgates will be open to disembogue water and desilting, the water lever will drop to 145 meters during the flood season, and the water lever will be risen to 175 meters after the flood season, this process will form hydro-fluctuation belt with a drop of 30 meters in maximum water level in the areas along the river. It is also a gallery for exchange things and energy between land and water system. Nowadays, environmental pollution is aggravating, the destruction of bio-diversity, healthy problems of people, and geological disaster around the hydro-fluctuation belt, these problems happen occasionally. However, the ecological health risk assessment and prediction is still in testing and groping stage. This paper tried to make a study from ecological processes to landscape and hydro-fluctuation belt scale. It combined remote sensing(RS), geographical information system(GIS) and principle of landscape ecology methods. The study utilized with the methodology on combination of microscopic and macroscopic, established comprehensive evaluation index system, which selected some categories such as ecology, physical chemistry, social economy and human health. Model was set up and used to assess and predict ecological health risk of the hydro-fluctuation belt. The comparison between the results of assessment and prediction and real condition indicted that this method is accurately and effectively.
Keywords: hydro-fluctuation belt; GIS and RS; ecological health; assessment and prediction

Microbial reduction and precipitation of vanadium (V) by autohydrogentrophic microorganisms

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Abstract: As one of transition metals, vanadium (V) in trace amounts represents an essential element for normal cell growth, but becomes toxic when its concentration is at the ppm level. It can increase cellular differentiation, gene expression alterations, and other biochemical and metabolic alterations. In China, the vanadium concentration in drinking water is limited to below 0.05 mg/L (GB 5749-2006). The bioreduction of oxidized V(V) in a contaminated groundwater was investigated using autohydrogentrophic bacteria and hydrogen gas as the electron donor. Three controls (without biomass, without H2, and without vanadium) were carried out in parallel to ensure that all reactions were biologically mediated. In the abiotic control (no inoculum), the influent V(V) was unchanged, indicating the chemical reduction of V(V) by H2 was infeasible. In the control without H2 (N2 replaced H2), the removal percentage of total soluble vanadium was only 3%, showing that endogenous respiration and adsorption to biomass caused minimal removal of vanadium. The V(IV) concentration in the no-H2 control was almost zero, also indicated that V(V) was not reduced without an added electron donor. Neither V(V) nor V(IV) was detected in the control with no vanadium addition. V(V) was 95.5% removed by biochemical reduction when autohydrogentrophic bacteria and hydrogen were present, and the reduced V(IV) precipitated, leading to total-V removal. Reduction kinetics could be described by the firstorder model. Bioreduction was sensitive to pH and temperature, with the optimum ranges of pH 7.5-8.0 and 35-40oC, respectively. Phylogenetic analysis by clone library showed that the dominant species belonged to the β-Proteobacteria. V(V)-reduction was speculated to be carried out by novel species or known denitrification bacteria via a secondary-utilization mechanism.
Keywords: Vanadium, Groundwater, Bioreduction, Autohydrogenotrophic microorganisms, Hydrogen

Emission of greenhouse gases and airborne bacteria from a wastewater treatment plant using oxidation ditch

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Abstract: Wastewater treatment plants (WWTPs) are regarded as sources of greenhouse gases (GHGs) and airborne microorganisms. In this study, carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) as well as airborne bacteria were investigated from March to October in 2010 in a Beijing municipal wastewater treatment plant with Orbal oxidation ditch process. The CO2 emission was found to be connected with sludge retention time (SRT) and BOD of influent water. CH4 generated mainly from the dissolved CH4 brought by influent and its stripping from water could be promoted obviously by the mechanical motion of rotating brushes. SRT and water temperature were the major parameters on N2O emission. It was observed that only a few of N2O produced during denitrification process. Complex factors including ambient temperature, relative humidity, wind speed, solar radiation and distance from rotating brushes influenced the concentration of the airborne bacteria in atmosphere. The emission of GHGs and airborne bacteria showed seasonal variation. In summer, the emissions of N2O and airborne bacteria were higher than that in spring and autumn, while the emission of CO2 was lower than the other seasons. The emission of airborne bacteria had positive correlation with N2O and negative correlation with CO2. No obvious relation between CH4 and airborne bacteria release. As shown in this study, WWTPs should be paid more attention for being a source of airborne bacteria and GHG emissions.
Keywords: greenhouse gases; airborne bacteria; oxidation ditch; wastewater treatment plant; factors

Toxicity studies of three antibiotics on Microcystis aeruginosa

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Abstract: Toxicity tests were performed with three antibiotics, enrofloxacin, erythromycin thiocyanate and tetracycline, on Microcystis aeruginosa by determining a battery of parameters including algal biomass, chlorophyll fluorescence index Fv/Fm, superoxide dismutase (SOD) and malonaldehyde (MDA) in this paper. Furthermore, the additivity of the three antibiotics was measured in this study. The results showed that all of the testing antibiotics inhibited the growth of M. aeruginosa in different degree, and the 96h-EC50 values on M. aeruginosa were 84.6 μg/L, 48.2 μg/L and 2.92 mg/L respectively. The chlorophyll fluorescence and photosynthetic pigments were also inhibited, and the inhibition effect increased with the increasing concentration of antibiotics. While the soluble protein content first increased and then decreased. What"s more, the joint action tests showed part additive effect using both toxic unit method and mixture toxicity index method. The study indicate that testing antibiotics hinder photosynthesis of M. aeruginosa, inhibit the synthesis of soluble protein, thus inhibits the growth of M. aeruginosa. Furthermore, considering the high probability of having complex mixtures of different antibiotics, the additive effect of each individual antibiotic with normal antibiotics is needed.
Keywords: antibiotic, toxicity, algae, Chlorophyll fluorescence, soluble protein

Enhanced hydrogen production of Rhodobacter sphaeroides promoted by extracellular H+ of Halobacterium salinarum

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Abstract: Rhodobacter sphaeroides is a photosynthetic non-sulfur purple bacterium and can produce hydrogen under anaerobic conditions through nitrogenas. Halobacterium salinarum, an archaeon and lives under extremely halophilic conditions, owns a retinal protein bacteriorhodopsin (BR) in its purple membrane acted as a light-driven proton pump. The phototrophic hydrogen production experiments in R. sphaeroides were performed co-culture with

free packed cells (PC), purple membrane fragment (PM), and immobilized PC of domesticated H. salinarum, respectively. Using the protons from H. salinarum BR by R. sphaeroides nitrogenases, the yields of hydrogen production under mixed culture increased obviously compared with single culture, and would increase as the BR concentration enhanced in a certain range. The stability of hydrogen production system greatly improved after PC immobilized, and the time for hydrogen production of R. sphaeroides significantly extended on same condition. Under a mixed culture system, separated by a cation exchange membrane, the protons of H. salinarum were obviously transferred to another pool to produce hydrogen. As additional electricity added under 0.3v, the hydrogen production rate increased with voltages in the coupled system. These results are helpful to build the hydrogen production coupled system by nitrogenase of R. sphaeroides and proton pump of H. saliuarum.

Keywords: R. sphaeroides; H. salinarum; Proton pump; Coupled system; Electrochemically assisted microbial production of hydrogen

Structure dynamics and function of microbial community in a denitrifying dephosphatation system

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Abstract: The microbial communities in an anoxic tank of an anaerobic-anoxic/nitrifying (A2N) two sludge system coupled with induced crystallization (IC) were investigated for denitrifying dephosphatation process. Similar microbial relative abundance distribution profiles were observed in both the sequencing batch and continuous flow reaction systems. The *phosphorus* accumulating organisms (PAOs) consistently accounted for more than 70% of the eubacterial density with the denitrifying phosphateaccumulating organisms (DPAOs) identified as the predominant species. The increase of COD to phosphorus feeding ratios from 18:1 to 63:1 steadily enhanced the phosphorus removal rates, but no statistically significant effects were observed on the PAO relative abundance. The change of COD to nitrogen feeding ratio from 5:1 to 6:1 restrained both the phosphorus and nitrogen removal efficiencies, and the PAOs‟ relative density. The relative density distribution of GAOs mirrored the PAOs distribution, which revealed the existence of carbon competition between PAOs and g*lucose* accumulating organisms (*GAOs*) in the denitrifying dephosphatation system. The Actinobacteria class and the Rhodocyclus genus were identified as the important DPAOs contributors. The non-comparable abundance distribution profiles of Actinobacteria, Rhodocyclus, and PAOs hinted that the phylogenetic diversity and the predominant DPAO density secured the functional stability of denitrifying dephosphatation in the A2N-IC system.

Keywords: denitrifying phosphate-accumulating organisms (DPAOs), phosphorus accumulating organisms (PAOs), microbial relative density distribution, anaerobic-anoxic/nitrifying/induced crystallization process (A2N-IC), phosphorus removal.

Research on eco-compensation for water conservation based on WTA: case study of Miyun Reservoir, China

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Abstract: Eco-compensation is an effective economic management method for ecological protection and has been widely used for water resource protection. The determination of eco-compensation standard is the key issue in eco-compensation research, as it is hard to quantify the variation of stakeholders‟ benefits exactly. For this case, the willingness to accept (WTA) was brought into the accounting system of eco-compensation standards in this paper, with the case study of Miyun Reservoir conservation area. In this paper, the econometric models were built based on the contingent valuation questionnaires, and the influential factors of stakeholders‟ willingness and WTA amount were studied respectively. The results showed that the average value of Miyun Reservoir residents‟ WTA was about 1700 yuan/family/year. While, the distance

to reservoir, job types, and the cognition of eco-compensation showed significant effect on their bid values.

Keywords: contingent valuation method； preference analysis; questionnaire survey; Miyun Reservoir

E-Waste Recycling at Jackson State University

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Abstract: In past 12 years, Jackson State University (JSU), Department of Technology, Hazardous Materials Management program was subcontracted by Hinds County to recycling the electronic waste in the county. The Mississippi Department of Environmental Quality (MDEQ) funds the program. The program name is “JSU/Hinds County/MDEQ Obsolete Computer Recycling Program”. The name of program we supposed to collect obsolete computers only, but that is not true. We received computers, servers, printers, routers, switches, plotters, docking stations, telephones, TVs and more. Some donors may ask us to take their office furniture when we pick up their computer equipment. The donors are from personal home, private business, city, county and federal governmental agencies, colleges and universities. The uniqueness of this program is we refurbish computers and return them back to the community. Jackson State University is a State supported University. For this special program, all donated materials are not on the university"s inventory list, we do not take any materials disposed of by JSU. There is absolutely no monetary involvement what so ever. The recipients of computer systems, includes non-profit organizations, low income families, churches, and day-care centers. Up to date, we have collected 9,712 central processing units (CPUs), 3, 883 mice, 9,013 monitors, 6,475 keyboards, and 2,886 printers. There have been 3, 264 refurbished computers systems returned to the community. We estimate one system occupy three square feet of landfill space, at least 9, 972 square feet of landfill space were saved. The program also collaborates with a local high school and summer programs to teach students how to refurbished computers. The program received seven awards. In 2004, the program received the United States Environmental Protection Agency (USEPA), Waste Wise program, “Electronic Challenge Partner of the Year” award. The program is not only saving precious material, landfill space and also extends (second) the life of computer systems.

Keywords: waste, recycling, EPA, solid waste, E-Waste

Study on Nitrogen Transformation of Paper-making Wastewater by Ozonation

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Abstract: The papermaking wastewater bio-chemical effluent was oxidized by ozone which was produced by air source ozone generator. Study content changes of different forms of nitrogen in wastewater in the ozonation process, and analyze the mechanism of air source ozone generator producing nitrogen oxides in this paper. This paper also studied the effects of the ozone dosage and contact time on the nitrogen content of oxidation effluent. The results showed that because of the air source, while producing ozone it would produce a small amount of nitrogen oxides which dissolved in wastewater. This caused total nitrogen content of wastewater to increase, and the effluent total nitrogen content were as 1.01~1.38 times as that of the influent. When the ozone dosage were 63.58~149.57mg/L, the total nitrogen content in effluent were 1.04~1.13 times that in the influent. With the increase of ozone dosage, the total nitrogen content was increasing. But there is no obvious linearity correlation between ozone dosage and the change rate of total nitrogen content. With the increase of contact time, the change rate of total nitrogen was increasing. When contact times were 0.62~2.40h, the total nitrogen content in effluent were 1.07~1.38 times that in influent. The testing increasing of nitrogen content in effluent is 2.778mg/L, less than dissolved quantity 7.000mg/L of nitrogen by counting, and its transformation rates 39.68% only. The flow chart of pilot system is shown in Figure 2.1. The ozone generator is CF-G-2-100g-type, whose ozone yield is 100g / h, and the concentration is 20~30mg / L. The dimension

of ozone contact oxidizing tower"s outer casing is Φ500× 6000mm.This experiment changed ozone dosage (mgO3 / LH2O) through changing the intake ozone concentration (by the change of the ozone generator power). The amount of treatment water in this experiment was 450 L/h.
Keywords: papermaking wastewater, ozonation, nitrogen transformation, ozone generator

Impact of Sulfate on Selection of Remediation Methods – Lesson from Several Case Studies

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Abstract: Sulfate is one of the major anions commonly observed in groundwater. In chemical or biological reduction treatment of soil/groundwater, sulfate can be reduced to sulfide following iron/manganese reduction. For sites contaminated with chlorinated solvents or hexavalent chromium, chemical and biological reductions are commonly used treatment methods, and background sulfate concentration should be a key factor in selection of treatment method. High background concentration of sulfate can exert significant amount of electron donor demand, and therefore increase the reagent cost of reductive remediation methods. Furthermore, high concentration of sulfide as a result of sulfate reduction can be toxic to microbial population and inhibit the biodegradation of contaminants. For chlorinated solvents contamination where both in-situ chemical oxidation (ISCO), in-situ chemical reduction (ISCR), and in-situ biological reduction (ISBR) are all viable treatment methods, higher priority should be given to ISCO if high background sulfate concentrations are encountered. However, for sites with hexavalent chromium contamination where reduction (either ISCR or ISBR) is the only viable treatment pathway, caution should be used in selection of remediation amendment to avoid sulfide toxicity resulted from sulfate reduction. Several case studies will be presented to illustrate the impact of sulfate concentrations on evaluation and selection of remediation methods.

Adsorptive removal of thiocyanate by layered double hydrotalcite modified with silver chloride

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Abstract: As an interesting anionic clays with strong adsorption capability, layered double hydrotalcites (LDHs) have been widely utilized as efficient adsorbents for removing various inorganic ions and organic pollutants. In the present work, we reported a novel adsorbent based on LDH modified with AgCl nanoparticles (AgCl/LDH) for removal of thiocyanate, a typical inorganic pollutant which was widely present in coke and other industrial wastewater. The AgCl/LDH was synthesized based on the reaction of Cl--containing LDH with Ag+. Using such AgCl/LDH as adsorbent, the removal of thiocyanate under various conditions was systematically investigated. Compared with unmodified LDH, AgCl/LDH exhibited a higher adsorption capacity for thiocyanate. The adsorption of thiocyanate on AgCl/LDH follows the Langmuir isotherm model and belongs to chemical adsorption. Moreover, the adsorptive removal of thiocyanate on AgCl/LDH was found to be not sensitive to solution pH. The large adsorption capacity and widely applicable pH range of AgCl/LDH enable this material to be used as a promising adsorbent for removal of thiocyanate in wastewater.

Modeling analysis and Adsorption Characteristic Studies of the phosphorus in Honghu Lake wetland

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Abstract: The transformation and distribution characteristics of phosphorus in natural wetlands are significantly affected by human activities, such as large-scale water conservancy projects and agricultural activities. It is necessary to reveal the distribution characteristics of nutrients for elucidating its complex removal and retention mechanisms in natural wetlands. In this study, the self-organizing map (SOM) model was used in this study to assess the phosphorus data set of the wetland. The relationships between phosphorus and other water quality parameters were

revealed by the visualization function of the SOM model the modeling result was in agreement with the linear correlation analysis. Sediments, sampled from the riparian zone of the wetland, was selected as an example to investigate the adsorption characteristic of phosphorus onto soil with the Langmuir, Freundlich, and Redlich-Peterson isotherms by both the non-linear regression methods. The adsorption experiment was conducted to choose the appropriate method and obtain the creditable adsorption parameters for soil adsorption equilibrium studies. The results indicated that the SOM model was suitable for the assessment of field-scale date of natural wetlands. The non-linear regression method would be a better way to compare the better fit of isotherms for the adsorption of phosphorus onto laterite. Both the two-parameter Freundlich and the three-parameter Redlich-Peterson isotherms had higher coefficients of determination for the adsorption of phosphorus onto laterite at various temperatures. In addition, a relationship between Freundlich isotherm parameters and Redlich-Peterson isotherm parameters was presented.
Keywords: phosphorus; SOM; adsorption; water quality

Cloud Computing and Carbon Footprint

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Abstract: Cloud computing brings a new way to consume and manage IT resources conveniently and economically. Recent reports from the United States show that running a business application in the Cloud is generally more energy or carbon efficient than running it on-premise. Up to 90 percent reduction in carbon (CO2) emissions can be achieved using Cloud-based applications, depending on Power Usage Effectiveness (PUE), device utilization, and electricity source. Cloud computing can cut carbon emissions through (1) dynamic provisioning, (2) multi-tenancy, (3) server utilization, and (4) data center efficiency. However, the Cloud phenomenon may aggravate the problem of carbon emissions and global warming for wrong reasons. It is observed in China that blind initiation of cloud projects was largely driven by the “image building” projects and land enclosure movement. Without careful planning and technical knowhow, Cloud computing may create even more environmental hazards. For example, a poorly designed data center can result in wastage of energy, because a large data center will consume enormous electricity and generate massive heat that will require a large scale cooling system. This resentation starts with an introduction of Cloud computing concepts, service models, and measurement of carbon emission. It then elaborates on different phases of Cloud computing in power consumption and carbon emission. Finally, a summary of best practices to save energy and reduce carbon emission is proposed.

Degradation of bisphenol A by hydrogen peroxide activated with CuFeO2 microparticles as heterogeneous Fenton-like catalyst: efficiency, stability and mechanism

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Abstract: After being prepared from copper- and iron-containing precursors with a hydrothermal method,
CuFeO2 microparticles were characterized by scanning electron microscopy, X-ray diffractometry and Xray photoelectron spectroscopy. The as-prepared CuFeO2 microparticles were composed of pure rhombohedral crystalline particles with sizes in the range of 2-3 μm. As a composite oxide of Cu and Fe elements, the CuFeO2 microparticles showed much stronger catalytic ability toward the activation of H2O2 than Cu2O microparticles and Fe3O4 microparticles did. The catalytic activation of H2O2 produced hydroxyl radicals (•OH), causing rapid degradation and mineralization of bisphenol A (BPA). The use of 1.0 g L-1 CuFeO2 microparticles and 20 mmol L-1 H2O2 yielded a complete removal of the added BPA (0.1 mmol L-1) and 85% removal of TOC.

The microscaled CuFeO2 catalyst was confirmed to have merits of easy recycling and good stability by successive degradation experiments. The generation of •OH from the catalytic activation of H2O2 over CuFeO2 microparticles was evidenced using tert-butyl alcohol as a scavenger of •OH radicals and coumarin fluorescent probe technique. This activation was confirmed to be initiated by surface bonded Cu(I) and Fe(III).
Keywords: Oxidative degradation; bisphenol A; Fenton process; micro-scaled catalyst; CuFeO2

Feasibility of constructed wetland planted with Leersia hexandra Swartz for removing Cr, Cu and Ni from electroplating wastewater

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Abstract: The constructed wetlands planted with Leersia hexandra Swartz (CWL) in pilot scale were used to treat electroplating wastewater containing Cr, Cu and Ni. Effects of surface loading rate (SLR) and initial metal concentrations on removal of Cr, Cu and Ni were studied. It was found that CWL significantly reduced the concentrations of Cr, Cu and Ni in wastewater by 84.4%, 97.1% and 94.3%, respectively. High SLR decreased the removal efficiencies of Cr, Cu and Ni, however, the heavy metal concentrations in effluent met Emission Standard of Pollutants for Electroplating in China (ESPE) with the SLR less than 0.3 m3/ m2 d. For the influent of 5 mg/L Cr, 10 mg/L Cu and 8 mg/L Ni, effluent concentrations were below maximum allowable concentrations in ESPE, indicating that removal of Cr, Cu and Ni by CWL was feasible at considerable high influent metal concentrations. Mass balance showed that the primary sink for the retention of contaminants within the constructed wetland system was the sediment, which accounted for 59.5 %, 83.5 %, and 73.9 % of the Cr, Cu, and Ni, respectively. The data from the pilot wetlands support the view that constructed wetlands planted with L. hexandra could be used to successfully remove Cr, Cu and Ni from electroplating wastewater.
Keywords: Constructed wetland; Leersia hexandra Swartz; Cr; Cu; Ni

Renovation of used lithium cobalt oxide from lithium ion rechargeable battery by ultrasonic irradiation

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Abstract: Lithium-ion battery (LIB) is widely used as electrochemical power sources in mobile telephones and other modern-life appliances. As a result, huge amount of spent LIBs are generated. Recycling of LIBs has increasingly become important because their unsafe disposal will cause a serious problem due to the presence of flammable and toxic elements or compounds. Economic benefits could be achieved in recovery of major components from LIBs, especially for cathode materials LiCoO2. The effective recycling and reusing of spent LIBs has good environmental and economic benefit. Ultrasonic renovation can significantly improve the treating efficiency of precious components in spent LIBs. This work proposes a new process for renovating cathode materials LiCoO2 from spent LIBs in LiOH by ultrasonic hydrothermal reaction. The ultrasonic cavitation can provides partial higher temperature and voltage and hydroxyl radical which has strong oxidability. In order to get the best renovation effect, the optimal reaction condition was selected: 10 grams LiCoO2 with 2 mol of LiOH, 120℃, the ultrasonic power is 999W and ultrasonic method is “work 5S-stop 2S” and ultrasonic radiation for 10 hours. Through X-Ray Diffraction, scanning electron microscopy, ICP-AES and charge-discharge analysis, the results showed that the renovated LiCoO2 had high degree of crystallinity, fine layered structure, good dispersion of particles and improved electrochemical cycle performance. Finally, the renovated LiCoO2 under optimal operating conditions was assembled into button battery and its charge and discharge performance of the renovated LiCoO2 was 132.6 mAh/g and 131.5 mAh /g respectively. The first-time charge and discharge efficiency was 99.2%. After 20 times of cycling, the discharge capacity retention rate was 98.1% which could reach

electrochemical properties of commercial batteries. This process is feasible for recycling spent LIBs in scale-up.
Keywords: Spent lithium-ion batteries, LiCoO2, renovation, Ultrasonic reaction

Effect of short-time aerobic digestion on bioflocculation of extracellular polymeric substances from waste activated sludge

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Abstract: The effect of short-time aerobic digestion on bioflocculation of extracellular polymeric substances (EPS) from waste activated sludge (WAS) was investigated. Bioflocculation of the EPS was found to be enhanced by 2~6 h WAS aerobic digestion under the conditions of natural sludge pH (about 7), high sludge concentration by gravity thickening, and dissolved oxygen (DO) about 2 mg/L. With the same EPS extraction method, the TSS content reduction of 0.20 g/L and 0.36 g/L, and the VSS content reduction of 0.19 g/L and 0.26 g/L, were found for the WAS samples before and after aerobic digestion of 4 h, respectively. The scanning electron microscopy (SEM) images of the WAS samples before and after aerobic digestion of 4 h, showed that more EPS appeared on the surface of zoogloea by aerobic digestion, which reconfirmed that WAS aerobic digestion induced abundant formation of EPS. By WAS aerobic digestion, the flocculating rate of the EPS showed about 31% growth, almost consistent with the growth of its yield (about 34%). Both EPSs presented nearly the same components, structure, and Fourier-transform infrared (FTIR) spectra. These results revealed that short-time aerobic digestion of WAS enhanced the flocculation of the EPS by promoting its production.
Keywords: Extracellular polymeric substances; Waste activated sludge; Wastewater treatment plant; Aerobic digestion; Bioflocculation

Bromate formation in O3, UV/O3 and UV-microO3 processes for bromide-containing water

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Abstract: The utilization of reduced ozone dosage has been proposed in drinking water treatment for bromate control. Considering the fact that a low-pressure mercury UV lamp (emitting at 254nm and 185nm) can generate ozone at low concentration, a new technology called UV-microO3 process was introduced. In the technology, UV irradiation (254nm) and ozone generation by UV irradiation (185nm) were performed using the same UV lamp. Bromate formation and humic acid (HA) removal in O3, UV/O3 and UV-microO3 processes were comparatively investigated. Bromate concentrations in UV/O3 process were 2.13 ~ 2.93 times of that in O3 process when the same ozone dosages were applied in pure KBr solution. HA could inhibit bromate formation in three processes, while promotion of bromate formation by increase of pH was only observed in O3 process. Reducing ozone dosage could lessen both residual ozone concentration and hydroxyl radical (•OH) exposure, led to a slight drop in HA removal rate but a significant decrease in bromate formation. Hence, combination of UV irradiation and ozone at low dosage was a promising method towards bromate control and HA removal. Additionally, UV-microO3 process was proved to be reliable on both bromate control and HA removal and thus was recommended.
Keywords: bromate; UV-microO3; hydroxyl radical; UV irradiation; ozone

Enhancement effects of iron on the biomass production, nutrient removal and lipid accumulation of Scenedesmus sp.LX1

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Abstract: The approaches to increase microalgal biomass production and lipid content in the coupled system of microalgal cultivation and wastewater treatment have attracted worldwide attention. In this study, the effects of iron on the growth, nutrient removal and lipid accumulation of Scenedesmus sp. LX1 were investigated. With the increase of iron concentration from 0 mg·L-1 to 2 mg·L-1 in the culture medium, the biomass production Scenedesmus sp. LX1 increased from 0.17 g·L-1 to 0.54 g·L-1; the nitrogen and phosphorus removal efficiency increased from 15.7% and 80.6% to 97.0% and 99.2%, respectively; the lipid content was enhanced by 84.2%. The relationships between the carrying capacity (K) / the maximal population growth rate (Rmax) of Scenedesmus sp. LX1 and initial iron concentration were in accordance with the Monod model. Furthermore, with the iron addition into wastewater samples, the lipid content and lipid production of Scenedesmus sp. LX1 was improved by 56.8%, 21.5%, 10.3% and 61.5%, 33.8%, 17.2%, respectively for the wastewater sample A, B and C. Based on the results above, a promising approach to increase microalgal biomass production and lipid accumulation was proposed.
Keywords: Scenedesmus sp.LX1; biomass; nutrient removal; Iron

Study on influencing factor of phosphorus removal with two-stage biological filter by alternated aeration

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Abstract：In order to improve efficiency of phosphorus removal with traditional BAF technology，a new technique of a two-stage biological filter by alternated aeration has been put forward. Different factors effecting rate of TP removal，sush as the interval of anaerobic/aerated conditions，HRT(hydraulic retention time),DO(dissolution oxygen),rate of COD/TP，TN and NH3-N concentration of raw water,are studied. Results show that the phosphorus removal is over 80% in this new alternated aeration process with inverval of 12 h of anaerobic/aerobic， HRT 1.8h. when the average ratio of COD/TP in influent is 97，rate of TP removal is 83.39%.The concentration of DO in anaerobic phase is above 0.2mg/L，that is good for full phosphorus"s release,when the concentration of DO in effluent of aerobic treatment is 4.5－4.8mg/L，rate of TP removal can reach up 88.12%.The effect of denitrincation in this process is also evalunted，the removal rate of NH3-N and TN are 58.31% and 53.22%，respectively.
Keywords：Biological Aerated Filter(BAF); Alternation of aerobic/anaerobic; biological way of phosphorus removal

Emergent low-concentration Cr(VI) removal mechanism in a submerged membrane bioreactor for municipal wastewater

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Abstract: Cr(VI) is known to influence the aquatic environmental and the living organism health, thus the Cr(VI) concentration of effluence is restricted and high-concentration Cr(VI) pollution is rare in many countries. However, emergent low-concentration Cr(VI) is occasional in municipal wastewater treatment plants (WWTPs) of China due to industrial wastewater reveal from tanneries, electroplating, petroleum refining, metallurgy and so on, but little study is about its removal mechanisms in WWTPs, especially submerged membrane bioreactors (SMBRs). Emergent low-concentration Cr(VI) removal mechanism in SMBR for municipal wastewater were investigated. Compared with the blank run, emergent lowconcentration Cr(VI) had no apparent side effects on treatment efficacy. In addition, batch experiments of the biodegradation and the

adsorption were carried out to investigate the emergent low-concentration Cr(VI) removal mechanism through Cr(VI) concentration variations, three-dimensional excitation-emission matrix (EEM) fluorescence spectroscopy and Fourier-transform infrared (FTIR) spectroscopy. According to bath experiments, emergent low-concentration Cr(VI) removal was attributed to the biodegradability and the adsorption of activated sludge. Additionally, tyrosine, tryptophan, C-H groups of the alkanes and sulphonate groups played the major roles in the emergent low-concentration Cr(VI) removal mechanisms. Additionally, polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE) was carried out to disclose the key bacteria species responsible for the emergent low-concentration Cr(VI) removal. DGGE profile indicated that the emergent low-concentration Cr(VI) caused the obvious variations in bacterial community, especially the existence of Sulfuricurvum kujiense predicted that the sulfate pathway playing a significant role in the emergent low-concentration Cr(VI) removal mechanism.
Keywords: Emergent low-concentration Cr(VI); Submerged membrane bioreactor, Removal mechanisms;Municipal wastewater

Mesoporous Aluminosilicate Synthesized with Biomass Ash and Their Adsorption Properties to Heavy Metals Pb2+

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Abstract: Due to the biomass ash and the precursor of natural zeolites own similar composition, synthesis of zeolite with biomass ash was not only a feasible method in theory, but also a new way for resources utilization of biomass ash. Furthermore, Wastewater was treated with these zeolite materials and achieved the aim of waste control by waste. Synthesis process of zeolite A by direct hydrothermal crystallization of Alkali-melting biomass ash was systematically investigated. Meanwhile, the study of synthesis of MCM-41 from Silicon-Aluminum extraction liquid which was prepared from solid-liquid mixture of alkali-melting biomass ash by centrifugal separation was also performed. The structure, specific surface area and morphology of the samples were characterized with X-ray diffraction (XRD), Nitrogen adsorption-desorption, and Scanning electron microscopy (SEM). In this study, we prove the Pb2+ adsorption effect by this kind of mesoporous materials as an adsorbent for sewage. The experimental results show that adsorption rates to Pb2+ through this mesoporous materials could be over 95% under the condition that its pH more than 4, adsorption equilibrium can be finished in ten minutes. The result proves the material has relatively good adsorption effect.
Keywords: biomass ash, mesoporous materials, heavy metal icon, adsorption

Analysis of Present Situations of Industrial Carbon Emissions and Its Decoupling Relationship with Economic Development in the Central China

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Abstract: In order to establish reasonable developing route and provide the basis for realizing better low carbon economy for the central China, the analyzes of the present situations and the decoupling relationship between industrial carbon emissions and economic development of Hubei, Hunan and Henan province from 2000 to 2010 in the central China is explored in this paper. The analysis of the present situations includes industrial carbon emissions, industrial carbon emissions intensity and industrial carbon emissions per capita of these provinces in the past 10 years. The decoupling relationship between carbon emissions and energy consumption, between energy consumption and economic growth, and the influence between carbon emissions and economic growth are investigated by use of the Tapio model. The results show that it has been realized the weak delinking between industrial carbon emissions and economic growth in these provinces since 2002. However, the decoupling elastic coefficient is not small enough and it has

always been fluctuated with the time. The influences between industrial carbon emissions and economy are mainly the energy structure and the low energy efficiency. So it will take a long time to reach the goal of realizing the intensive delinking, which also proves the great possibility of reduction in the central China.
Keywords: the central China; industrial carbon emissions; decoupling; Tapio model

Optimization of phase time of SBR combined with simultaneous nitrification and denitrification and denitrifying dephosphatation

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Abstract: A sequencing batch reactor (SBR) was operated to combined both simultaneous nitrification and denitrification (SND) and denitrifying dephosphatation processes. The system reduced the oxygen demand and excess activated sludge production and was investigated for domestic sewage treatment with low ratio of COD/N. The process was composed of seven stages: feeding-anaerobic phosphorus release-SND-denitrifying dephosphatation-aerobic-sedimentation-drainage. With the temperature of 25~28oC, MLSS of 3200±58mg/L and water filling ratio of 66%, the influent and effluent concentrations of COD, TN, NH4+-N and TP were 200±5 vs. 9.0mg/L , 40±2 vs. 8.2mg/L, 40±2 vs. 0mg/L and 8±0.4 vs. 0.59mg/L, respectively. The optimized stage duration periods for anaerobic stage, SND stage, denitrifying dephosphatation stage and aerobic stage were 2h, 3h, 3.5h and1h, respectively. 42.2% of COD was removed at the end of anaerobic phosphorus release stage when the ORP variation rate dramatically decreased to almost zero. DO was maintained at 1 mg/L during the SND stage and rapidly rose when NH4+-N was completely consumed. pH started to increase instead of decrease when the denitrifying dephosphatation stage was over. TN removal rate was 72.56% in SBR. The nitrogen removal rates by SND and denitrifying dephosphatation was 11.24% and 76.92%, respectively. Meanwhile, 89.6% of TP was removed in SBR and the removal rate of TP was 95.2% during the denitrifying dephosphatation stage. The findings provided the effective nitrogen and phosphorus removal strategies for low C/N sewage.
Keywords: sequencing batch reactor (SBR), denitrifying dephosphatation, simultaneous nitrification and denitrification (SND), optimization of phase time

Shanghai's CO2 Emissions and policy implication for low carbon construction

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Abstract: Climate change and greenhouse effect issues have been the focal points around the world in recent years. Cities are the main contributors of anthropogenic greenhouse gases (GHGs) emissions due to densely populated and resource-intensive regions. Fortunately, more and more cities have been involved in global climate action efforts. Low carbon practices have been launched with diverse set of projects both in developed countries and developing economies. As one of the largest megacities of China, Shanghai is one of the major carbon dioxide emitters and people have attached great importance to this phenomenon and treated it seriously. With the instruction of scientific development viewpoint, Shanghai has made significant progress in emissions reduction through technological innovation, industrial structure adjustment, promoting energy efficiency and utilization of renewable energy, and absorption of CO2 using forest and wetland, since bidding for Expo 2010. The objective of this work is to understand Shanghai"s GHGs emissions between 1990 and 2010, and to find some useful policy suggestions for the policy makers. CO2 emissions are used as an example for scientific analysis of GHGs emissions in Shanghai, the measures taken by Shanghai for reduction in GHGs and their results since bidding for Shanghai Expo were analyzed and some remarks and recommendations for future Shanghai"s GHGs reduction was constructed.
Keywords: Climate change；Greenhouse gases；Emissions reduction

Correlation of key control factors for the formation and stabilization of aerobic granule

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Abstract: The aerobic granular sludge technology has demonstrated significant advantages in areas of the simultaneous biological nitrogen and phosphorus removal, toxic organic compounds degradation, sludge-water separation improving, and residual sludge minimization in biological treatment systems. However, the critical control factors and their relation during sludge granultion have not been revealed indeed, and the stability of granular sludge still existed issues. The Gray's correlation analysis method was used to analyze the correlations of aerobic granular characteristics and control factors in the study. Results showed that the correlation between the sludge sedimentation velocity (SV) and total biomass density (TBD) was 0.828; the correlations between the sludge SV and sludge volume index (SVI) and the sludge particle diameter (D) and TBD were 0.804 and 0.779, respectively; and the correlation between the SVI and TBD was only 0.664. It‟s speculated that the organic loading rate (OLR), hydraulic shear stress (HFS), and sludge settling time (SST) were the major factors controlling aerobic sludge granulation. The priority selection of parameters for associated regulating was important for the operation of granular sludge system. The formation mechanism of aerobic granules was proposed based on the factors which affect sludge granulation identified above.

Keywords: aerobic granule, gray's correlation analysis, control factor, correlation, associated regulating

Application of Geotechnical Engineering in Environmental Remediation Projects – Case Histories

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Abstract: Remediation of contaminated sites is usually a multi-discipline practice including not only the environmental engineering, but also other disciplines such as the geotechnical engineering. In some cases, the geotechnical engineering can play an important role to ensure the success of the remediation. This presentation will give an overview of the application of geotechnical engineering in environmental remediation projects through several case histories. The case histories include a low-activity radioactive mining waste disposal facility, a former chemical manufacturing facility, and a lake site with contaminated sediments. In these cases, geotechnical engineering has been applied to evaluate the slope stability, foundation settlement, and integrity of the containment systems, which has resulted in safe and costeffective implementation of the selected remedial plans.

Research and Solution of Occupational Noise in Some In Print Industrial Factory in China

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Abstract: Hearing loss is an occupational problem happened frequently in industrial factory. In the article, we investigate an industrial factory for several months, including the habit of worker and current noise situation of the environment. The conclusion shows some working area is exposed to high level noise, which is necessary to execute both noise reduction and hearing protection. And the whole region should be separated into different colors to warn the worker of different noise level.

Lost in Translation

What do you think??

- "The last word in ignorance is the man who says of an animal or plant "what good is it?""

Translation 1 (翻译 1): "愚昧无知到了极点就像一个大老粗问："动物和植物有什么用？""

Translation 1 (翻译 2): "不知万物灵，无知愚昧您"

Translation 1 (翻译 3): "　　" (what is yours?)