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Gregory T. Papanikos

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PREFACE

This abstract book includes all the abstracts of the papers presented at the *5th Annual International Symposium on Environment, 20-23 May 2010,* organized by the Environmental and Agriculture Research Unit of the Athens Institute for Education and Research. In total there were 87 papers and 99 presenters, coming from 33 different countries (Armenia, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Finland, Germany, India, Indonesia, Iran, Ireland, Italy, Japan, Kingdom of Saudi Arabia, Korea, Latvia, Malaysia, Poland, Qatar, Republic of Srpska, Roumania, Russia, Saudi Arabia, Serbia, South Korea, Spain, Taiwan, The Netherlands, Turkey, U.K, and USA). The conference was organized into 24 sessions that included areas such as Environment Remediation – Bioremediation, Energy, Waste Composting – Photosynthesis, e.t.c. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 100 international conferences and has published over 80 books.

Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
Director

Heavy Metal Profiling in the Sediments from Matang Mangrove Forest, Perak

Rahimah Abdullah
Graduate Student, University of Malaya, Malaysia
Wang Chee Woon
Professor, University of Malaya, Malaysia
Mohd Jamil Maah
Professor, University of Malaya, Malaysia

The Matang Mangrove Forest Reserve (4°50'N, 100°35'E) is located in the state of Perak, on the northwest coast of Peninsular Malaysia. It is actually comprises of 19 independently gazetted forest reserves and measures about 40,446 hectares excluding major waterways. The reserve forms a large, crescent-shaped embayment stretching for about 50 km along the coast bordering the Straits of Malacca and is 13 km in depth at its widest. The waterways of Matang Mangrove highest Forest Reserve make up a total surface area of 8,653 hectares with a mean water depth of 5 metres. These waterways form the important sites for fish cage aquaculture. The mudflats in this area are important culture beds for cockles (Anadara granosa), other marine fauna, especially fish and prawns and baited trap catching of mud crabs (Scylla serrata). The concentration of five (5) heavy metals, namely copper (Cu), cadmium (Cd), zinc (Zn), lead (Pb) and chromium (Cr) in water and sediment collected from eight selected sites in Sg Larut and Sg Sangga Besar, were determined by Inductively Coupled Plasma-mass spectrometry (ICP-MS) and Atomic Absorption Spectrometry (AAS), respectively. The water samples were filtered through a 0.45µm membrane filter before being acidified with concentrated nitric acid in plastic bottles. Sediment samples were collected using a coring sampler at the depth interval of 0-5, 5-10, 10-15 and 15-20 cm. The samples were placed in polyethylene bags, refrigerated and returned to the lab within 12-24 hrs. The sediment samples were freeze dried for 18-24 hours using Labconco lyophiliser. Pulverization and homogenization were achieved by grinding the sediments with a Teflon mortar. The grind sediments were passed through 0.5µm sieve and stored at -20°C until analysis. Both Standard Reference Material SRM 1646 Estuarine Sediment and SRM-BCR Fluka-estuarine water were used to check the accuracy and precision. The recovery showed good agreement between the certified and the analytical values. The surface sediments had higher total metal concentrations compared to the bottom sediment. The results of the sediment were assessed against the Dutch Criteria for Assessment of Soil Pollutants. The values found in this study were significantly lower than the intervention values.

Environmental Footprint and Efficiency of Energy from Photosynthesis

Janis Abolins
Research, University of Latvia, Latvia

The real driving force behind productivity in nature and in economy is efficient use of energy and other assets. The land being the ultimate factor determining whether the human needs of energy can be satisfied by the products of photosynthesis (the biomass) is the measure of the environmental (or ecological) footprint of using biomass as a source of renewable energy. Attention is paid to consequences related to adding another 10 per cent of the net annual product of photosynthesis to the share the humans already control to satisfy the ever growing needs in land.

The authors compare efficiency and the land area per unit of primary energy obtainable from biomass in case of growing different energy crops with respect to sustainable supply of energy and chemicals from products of photosynthesis and argue in favour of co-production of energy and other commodities on the same land area. Preferably the product of natural photosynthesis and land should be used to provide food, chemicals, and materials the fuels being produced from waste and agricultural by-products, such as straw in which case the same area of land supplies food and energy minimizing the ecological footprint of energy consumption by civilization.

Forest industry bio-refineries clustered according to the principles of integrated technologies is suggested for conversion of biomass to chemicals, fuels, and materials conforming to the concept of Zero Emissions by:

- Introducing sustainable cycles as found in nature;
- Reorganizing the industries into clusters so as to fully match each industry's wastes/by-products with the input requirements of another industry, the integrated whole producing no waste of any kind;
- Shifting from the traditional industrial model considering wastes as the norm to systems of wasteless integrated technologies using everything up.

Examples of bio-refinery clusters will be presented.

Comparison of Different Co-processing Methods for Waste Tyre and Lignite Mixtures

Pinar Acar Bozkurt
Research Assistant, Ankara University, Turkey

The disposal of scrap tyres is a big environmental problem especially for the industrial countries. Waste tyres are usually dumped in open or landfill sites, which result in significant environmental disturbances and dangerous situations. Rubber is the main component of tyre. The structure of rubber is a cross-linked polymer, which is neither soluble nor fusible. Because of their complex nature, tyres cannot be easily recycled in the nature. There are many different methods for waste tyre recycling. Among these alternatives for tire recycling, such as retreating, reclaiming, incineration, grinding, etc, pyrolysis and extraction have been proposed as a suitable recycling technology. The pyrolysis and extraction have been applied over the years to carboneous materials like coal. Tyres contain polymeric aromatic structures that are similar to coal. Hence, the developed techniques used in coal utilization should be feasible to the pyrolytic destruction of waste tyres. Therefore, there has been an increased interest in the co-processing of waste tyres with coal.

In this study, Turkish lignite, waste tyre and mixtures of lignite-waste tyre are pyrolyzed and extracted with supercritical toluene at different temperatures. Lignite and waste tyre are mixed well in amount of 33 wt %, 50 wt % and 67 wt %. The results obtained from pyrolysis and extraction process are compared with each other. In addition, the effect of temperature and the amount of waste tyre in the coal-waste tyre mixture on the tar, gas and residual coke yields are investigated. The mixtures are pyrolysed at temperatures of 400, 500, 600 and 700 0C and also subjected to the supercritical toluene extraction (SCTE) at the temperatures of 400, 450 and 500 0C. In the pyrolysis process the maximum tar yield is obtained at 700 0C when 67 wt % of waste tyre is added to the lignite. In supercritical toluene extraction process the maximum tar yield is obtained at 500 0C when 50 wt % of waste tyre is added to the lignite. When the tar yields obtained by pyrolysis and SCTE are compared, the enhanced amounts of tar are produced during SCTE.

The variation of the yields and the effect of synergism on co-process are also investigated for both experimental runs.

Removal of Remazol Brilliant Blue R from Aqueous Solution by Adsorption onto Modified Charcoal Prepared from Peanut Shell

Bilal Acemioglu
Associate Professor, University of Kilis 7 Aralik, Turkey
Neslihan Sakalar
Associate Professor, University of Kilis 7 Aralik, Turkey
M. Hilal Bilir
Associate Professor, University of Kilis 7 Aralik, Turkey
M. Hakki Alma
Kahramanmaras Sutcu Imam University, Turkey

Nowadays the thousands of dyes are used by various industries such as paper, rubber, plastic, paiting, dyeing and cosmetics. Dye pollution from industrial effluents disturbs human's health and ecological equilibrium. Some dyes show carcinogenic and mutagenic effect when inhered and contacted skin. Therefore, it is to require the removal of the dyes from wastewater. For this purpose, it has been developed many methods such as activated carbon adsorption, chemical coagulation, ion exchange, electrolysis, biological treatments, etc. Of those methods, activated carbon adsorption is highly effective for the removal of organic, inorganic and dye pollution from industrial effluents. However, the use of activated carbon is not suitable for developing countries because of its high cost. A large number of low-cost sorbents such as peat, fly ash, rice husk, sawdust, fungal, yeast, etc. have been utilized for the removal of dyes from wastewaters.

In this work, modified charcoal prepared from peanut shell was used as an adsorbent for the removal of remazol brilliant blue R (RBBR) from aqueous solution by batch and column adsorption. The adsorption of remazol brilliant blue R was investigated as a function of initial dye concentration, pH and temperature. Moreover, the isotherm and kinetic studies of the adsorption process were conducted.

Batch adsorption experiments were performed using 0.25 g of the peanut shell charcoal with 50 ml of dye solution in 250-ml Erlenmeyer flasks as functions of concentration, temperature and pH. The samples were shaken in a temperature-controlled shaking water bath at 130 rpm. After the desired contact time, the samples were taken from shaking bath and they were centrifuged at 5000 rpm for 5 min. Concentrations of dye remained in supernatant were determined using T80 UV/Vis Spectrometer at a wavelength of 593 nm which is maximum absorbance.

It was determined that it was decreased with increasing solution pH while adsorption was increased with increasing initial dye concentration and temperature. The maximum adsorptions were between 94% and 98% under all the experimental conditions studied. The values of adsorption obtained from column experiments were between 95 and 99 %. Adsorption isotherm was consistent with only Freundlich model. The kinetics of adsorption followed the pseudo second-order, it was partially in agreement with the intra-particle diffusion models. From the results of the

adsorption experiments, it could be concluded that low-cost peanut shell charcoal was used as a potential sorbent for the removal of other dyes as well as RBBR from wastewaters.

Biosorption of Three Commercial Dyes from Aqueous Solutions Using *Posidonia Oceanica*

Maria-Isabel Aguilar
Assistant Professor, University of Murcia, Spain
Victor F. Meseguer
Assistant Professor, University of Murcia, Spain
Juan F. Ortuno
Assistant Professor, University of Murcia, Spain
Ana Belen Perez-Marin
Researcher, University of Murcia, Spain
Jose Saez
Professor, University of Murcia, Spain
Mercedes Llorens
Professor, University of Murcia, Spain

Dyes are widely used in textile, leather, paper, plastic and other industries and even in very low concentrations affect the aquatic life. Hence, their removal from waste effluents becomes environmentally important. Biosorption is emerging as an attractive alternative to classic treatment techniques for dyes removal from solutions.

This work evaluates the biosorption potential of dead biomass of Posidonia oceanica (an inexpensive material abundant in the beaches of the Mediterranean Sea) for the removal of three different commonly used dyes: methylene blue (MB: a basic cationic dye), Orange II (OII: an azo dye) and Remazol brilliant blue (RBB: an anthraquinone reactive dye).

The effects of particle size, adsorbent dose and solution pH on dyes removal were studied. Results show that the higher the adsorbent dose the higher the percentage dyes removal. No significant influence of particle size on sorption capacity was observed at the studied experimental conditions. Regarding the pH, their effect on sorption capacity differs with the three dyes. Sorption of MB increased while that of OII decreased as pH of respective dye solutions increased. The higher sorption capacity of RBB was obtained at low pH values (1-2).

Batch kinetic and isotherm studies were also carried out. Kinetic study revealed that the adsorption of the three dyes on Posidonia oceanica was gradual and equilibrium was reached within 20 h for OII and MB and within 72 h for RBB. Pseudo second-order model was appropriate for the description of kinetic experimental data. Langmuir, Sips and Redlich-Peterson models, are very suitable in correlating equilibrium data. Maximum sorption uptake of 29,2 mg/g for OII, 308 mg/g for MB and 31,1 mg/g for RBB were obtained according to Langmuir model.

The results in this study indicated that Posidonia oceanica is an attractive candidate for removing dyes from aqueous solutions.

Combustion Synthesis of Metal Hydride for Chiller using Waste Heat

Shino Sasaki
Researcher, Hokkaido University, Japan
Tomohiro Akiyama
Professor, Hokkaido University, Japan

Metal Hydride (MH) chiller using waste heat is quite attractive from cooling agriculture products without chlorofluorocarbon (CFC) as a cooling medium and reducing the supply of electric energy and the emission of carbon dioxide as much as 90% in conventional vapor compression heat pump. In principle, MH chiller is a kind of chemical heat pump using two kinds of MH, in which waste heat at 393K changes to cold heat in the form of cold water at 278K, for example. However, since MH is generally produced based on time & energy-consuming ingot metallurgy with so-called activation treatment of repeated hydrogenation-dehydrogenation procedure, it causes trouble in practical application of MH chiller. Therefore, the purpose of this paper was to produce TiFe0.9Ni0.1 for MH chiller by Combustion Synthesis (CS) based on innovative powder metallurgy. In the experiments, well-mixed three metallic powders with molar ratio of Ti : Fe : Ni=1 : 0.9 : 0.1 were uniformly heated to 1358K of Ti-Fe eutectic temperature for the ignition, then the products cooled were mainly evaluated from activation treatment and Pressure-Composition-Isotherm (PCT) property. Here, different commercial-available titanium powders; spherical titanium powder and irregular sponge one, were also examined as an acceptable raw material. As a result, XRD identified the generation of TiFe0.9Ni0.1 phase in the products obtained from spherical/sponge titanium successfully. The product obtained from spherical powder stored hydrogen more quickly at 298K under an initial pressure of 4.1MPa, in comparison to sponge powder. In conclusion, the products showed the same PCT curves at 293K in temperature and 4MPa in pressure, showing only single plateau and hydrogen content of 1.1 mass%. The results also appealed the possibility of a new MH production process for chiller using industrial waste heat with many benefits of saving energy, reducing carbon dioxide emission, and controlling picking season of agriculture product.

Heavy Metals Uptake in Plant Parts of Sweet Potato Grown in Soil Fertilized with Municipal Sewage Sludge

George F. Antonious
Principal Investigator, Kentucky State University, USA
Sam O. Dennis
Tennessee State University, USA
Jason M. Urine
Kentucky State University, USA
John C. Snyder
Kentucky State University, USA

Agriculture in the Commonwealth of Kentucky is a major industry. About 80% of the farmers are limited resource farmers who are in great demand in finding alternative to synthetic fertilizers to face the sharply escalating production costs associated with the increasing costs of energy and fertilizers and problems of soil deterioration and erosion associated with intensive farming systems. Municipal sewage sludge (MSS) could be used as alternative to synthetic fertilizers. However, bioaccumulation and mobility of heavy metals from MSS into growing plants could increase the potential transfer of heavy metals through crops to animals (feed crops) and humans (food crops). A completely randomized experimental design with three treatments (six replicates each) was used to monitor the impact of mixing native soil with MSS or yard waste (YW) mixed with MSS (YW +MSS) on 1) concentration of seven heavy metals (Cd, Cr, Mo, Cu, Zn, Pb, and Ni) in sweet potato tubers at harvest, 2) concentration of heavy metal in sweet potato leaves, stem, and feeder roots under three soil management practices, and 3) crop yield and quality. Soil and plant samples were taken and analyzed for extractable metals. Elemental analyses were performed using inductively coupled plasma mass spectrometry (ICP-MS). The study has indicated that the concentration of Pb was greater in YW than MSS soil amendments. Total concentrations of Pb, Ni, and Cr were greatest in plants grown in MSS+YW treatments compared to control plants. MSS+YW treatments increased tuber yield, ascorbic acid, soluble sugars, and total phenol contents compared to control plants. Concentration of heavy metals in MSS amended soil and sweet potato tubers were below their respective permissible limits. Soil amendments could be exploited for raising the nitrogen, carbon, and phosphorus cycles in agricultural soils.

A pH-control System for Wastewater Neutralization Process

Jose M. Aragon
Professor, University Complutense of Madrid, Spain
Maria C. Palancar
Professor, University Complutense of Madrid, Spain
Carmen Heredia
Professor, University Complutense of Madrid, Spain

Neutralization is included in wastewater treatment either to reach a set point adequate for secondary and tertiary treatments or due to wastewater pH governmental limitations. Neutralization has several difficulties because it has inherent no linearity and high sensitivity to small perturbations around the equivalence point. In addition, the streams that are being neutralized can have very complex, unknown and varying compositions.

This contribution contains the study, by simulation and experimentally, of a controller performance for pH-control purposes. The control is made by predictive Fuzzy Logic Control (FLC). The predictive performance is based on an Artificial Neural Network that allows calculating pH future values from present values of pH, valve stem position and pH derivative. The FLC considers the pH error, pH error derivative and pH cumulative error as the three input variables of the controller. The output variable is the valve stem position which regulates the flow rate of the neutralizing agent stream.

The process used to test the controller performance is the continuous neutralization of an aqueous stream of a mixture of acids with an aqueous solution of sodium hydroxide.

The experimental results obtained are compared with the ones obtained by simulation. The results have shown that the controller tuning obtained by simulation is not exact and a final tuning should be made in basis of the experimental performance.

The process noise influence on the pH response was studied too. The process noise originates a destabilization of the control system. The problem has been solved by implementing a digital filter of the pH data before sending them into the control loop. The controller implemented with the optimal configuration was able to carry out the start up of the process and to correct perturbations in the set point and concentration and flow rate of the acidic stream.

Organic Acid-induced Release of Lead from Pyromorphite and its Relevance to Reclamation of Pb-contaminated Soils

Joselito M. Arocena
Professor, University of Northern British Columbia, Canada

In situ immobilization of Pb into sparingly soluble pyromorphite [Pb5(PO4)3Cl] (PY) has been suggested as the most environmentally friendly and economical option to clean up Pb-contaminated soils. However, long term stability of PY in soils is not fully understood in the midst of recent information such as phosphorus extraction from PY by *Aspergillus niger* and rye grass. We conducted a one-year long batch dissolution experiments under ambient laboratory conditions to elucidate the release of Pb (and P) from PY by commonly found organic acids (e.g., oxalic, acetic and citric) at concentrations (100 and 50 μM) expected to occur in the root-soil interface (or rhizosphere zone). The synthetic material used in the experiment was confirmed to be pure PY by x-ray diffraction and electron microscopy while Pb (and P) in aliquot samples were measured using ICP. One of our results shows that concentrations of Pb in solution sampled within the first 30 days are at least 5 and 10 times higher for oxalic acid at 50 and 100 μM concentrations, respectively compared to milliQ water. The high amounts of liberated Pb in oxalic acid maybe due to several Pb-oxalate complexes. However, Pb concentrations observed for 50 and 100 μM concentrations are similar to Pb concentration in milliQ water after 1 and 5 months, respectively. We attributed the decline in Pb released with time to decay of ligands in the organic acids and/or gradual phase transformation in PY. Estimates of solubility of PY in milliQ water during the experiment are ~ 10-55 M which lie between the solubility product constant (ksp) values (10-25 to 10-64 M) for PY reported in literature. Our results suggest that organic acids in rhizosphere soils can potentially liberate Pb from PY and therefore, caution should be considered when P is applied to reclaim Pb-contaminated soils.

Separation of Textile Dye (Thioflavin T) by Using Supported Liquid Membranes

Mohammad Waqar Ashraf
Assistant Professor, Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia

Wastewaters from textile industries are mostly colored and contaminated by suspended solids, high COD and BOD values, acidity and other soluble substances. One of the tricky environmental problems associated with the textile industry is the removal of colour from textile effluent prior to discharge. The color is mainly due to the dyes used in textile industry. The molecules present in the textile effluent belong to very diverse chemical classes. Hence textile wastewater presents a challenge to conventional physico-chemical and biological treatment methods A laboratory study on supported liquid membrane (SLM) system has been investigated for removal and recovery of a textile dye from the aqueous solution using non-toxic and natural vegetable oils as membrane liquid. A flat sheet Durapore microporous PVDF film impregnated with vegetable oils, has been tested for transport of Thioflavin T, a cationic dye. The fundamental parameters influencing the transport of dye such as pH in the feed solution, HCl concentration in the strip solution, different type of oils, stirring speed and initial dye concentrations have been investigated. Maximum flux (1.68x10-5 mg-cm-2-sec-1) for the dye was obtained with sunflower oil as membrane liquid, with pH of feed solution at 12 and 0.3M HCl in strip. Maximum amount of dye was transported to strip side in 7 hours under optimized conditions.

Removal of Cu (II) from Inorganic Industrial Waste Leachate by Pumice

Nurdan Aycan
Master Student, Ondokuz Mayıs University, Turkey

The disposal of waste is landfills constitutes the last option in the so-called "options hierarchy" in the waste management in the world. Nevertheless, it stil remains widely used for both municipal and industrial solid waste. One of the problems arising from this form of waste disposal is the generation of leachate.

Leachate are liquid wastes produced at all landfill areas as water percolates through refuse which contains significant amounts of heavy metals and other contaminants and these cause a potential pollution problem for surface and ground waters. The composition of this leachate depends on the type of waste disposed of, landfill design, local rainfall, etc.

Heavy metals contamination exists in waste stream from many industries such as metal plating, mining, tanneries, painting, car radiator manufacturing, as well as agricultural sources where fertilizers and fungicidal spray intensively used. Cu (II) is among the most common heavy metal in these industries. The accumulation of Cu2+ in human body causes brain, skin, pancreas and heart diseases.

Many researchers have shown interest in the removal of heavy metals in leachate by adsorption on solid surfaces to improve efficiency, economy and effectiveness of productivity. The most respective and widely used adsorbent material in the adsorption processes is activated carbon. Even though it has a high adsorption capacity, surface area and has a microporous structure; it is restricted to use due to its relatively high price; high operation costs, and problems with regeneration for the industrial scale applications. This led to a search directed to developing the low-cost and locally available adsorbent materials with the maximum adsorption capacity.

Pumice is a type of extrusive volcanic rock, produced when lava with a very high content of water and gases is extruded (or thrown out of) a volcano. As the gas bubbles escape from the lava, it becomes frothy. When this lava cools and hardens, the result is a very light rock material filled with tiny bubbles of gas. Pumice is the only rock that floats on water, although it will eventually become waterlogged and sink. It is usually light-colored, indicating that it is a volcanic rock high in silica content and low in iron and magnesium. Since pumice is a volcanic rock, and retains its useful properties only when it is young and unaltered, pumice deposits are found in areas with young volcanic fields. Worldwide, over 50 countries produce pumice products. The largest producer is Italy, which dominates pozzolan production and also produces some pumice. Other major pumice producers are Greece, Chile, Spain, Turkey, and the United States.

This paper presents a study of the removal of Cu (II) present from an inorganic industrial waste leachate using pumice. The results indicated that pumice showed good adsorptive characteristics for the removal of Cu (II) ion from leachate and could

be used as adsorbent material due to its high uptake capacity and the abundance in availability.

Cattle Manure Management by Composting in Turkey

Mithat Sinan Binici
Researcher, TÜBİTAK Marmara Research Center, Turkey
Ebru Mehmetli
Principal Researcher, TÜBİTAK Marmara Research Center, Turkey
Ceren Tosun
Researcher, TÜBİTAK Marmara Research Center, Turkey
Ahmet Baban
Principal Researcher, TÜBİTAK Marmara Research Center, Turkey

In this study, the characteristics of cattle manures, collected from 7 cities (Amasya, Tokat, Corum, Afyon, Manisa, Canakkale, Kocaeli) located in 3 different geographical regions (Black Sea, Aegean, Marmara) in Turkey, were analyzed for composting. According to the literature, the total amount of cattle manure generated in these cities is 11% of the total manure amount of Turkey. The pH, moisture, volatile solid content, nutrients (C, N, P) %, and heavy metals (Ni, Mn, Cr, Cu, Pb, Cd, Zn, Hg) were determined in order to identify the physical and chemical characteristics of manure samples. The results were analyzed whether they meet the criteria for producing compost in good quality regarding to the literature.

The manure collected from Kocaeli was composted in laboratory scale composting units for 8 weeks. The relationship between time and temperature (°C), moisture and volatile solid content, pH, electrical conductivity (EC), nutrients (C, N, P) %, heavy metals, *Escherichia coli* and *Salmonellae*, were determined, in addition to that, Dewar self-heating test was done for determining compost maturity.

Electrolysis of Ammonia: Recovery of Energy from Ammonia Effluents

Gerardine G. Botte
Professor, Ohio University, USA

Ammonia is considered a threat to environmental quality because of its contribution to impaired air quality, surface water eutrophication, and nitrate contamination of ground water. Ammonia emissions to the atmosphere play a significant role in the formation of fine particulate matter (PM2.5). These fine particulates have been shown to cause respiratory problems in humans and contribute to haze and poor visibility. Furthermore, the deposition of ammonia and chemical compounds resulting from atmospheric chemical reactions with ammonia contributes to acidification and eutrophication of water and soil. Major sources of ammonia emissions include livestock operations, fertilizer use, waste management, mobile sources, industrial point sources, and various biological sources including human respiration, wild animals, and soil microbial processes.

Current technologies for the removal of ammonia from waste require an extensive amount of energy, in addition, the technologies most commonly used are not portable therefore, treatment of ammonia emissions from non-point sources, such as ammonia emissions from livestock and fertilizer use (non-point source pollution which usually comes from rural areas) are difficult to control because of the costs and the inherent complexities associated with the installation of waste water treatment units on every farm.

Ohio University has developed a new technology, "Ammonia Electrolysis" that allows the oxidation of ammonia to nitrogen with cogeneration of hydrogen.1-3 The overall cell reaction is given by:

$$2NH_3 \Leftrightarrow N_2 + 3H_2$$

The theoretical voltage for the overall reaction at 25oC is 0.058 V, which represents an energy consumption of 1.55 W-h per gram of H2 produced (a 95% energy reduction compared to water electrolysis). The resulting hydrogen can be used for heat and power generation.

In this paper, a technical and economical analysis will be presented on the use of ammonia electrolysis as a wastewater treatment process from different sources.

Lead Contamination in Soil at Yogyakarta, Indonesia: Distribution and Mobility

Wawan Budianta
Assistant Professor, Gadjah Mada University, Indonesia

This paper presents a study of Pb contamination of surface soil in Yogyakarta, Indonesia. The spatial distributions of Pb, as well as the key factors affecting the distribution of the contamination, were examined. The solubility and potential biological availability of Pb in soil sample was also investigated. By using geo-statistical method, the spatial distribution of Pb in study area seems to be correlated with the traffic condition of the city. It can be concluded that the contribution of gas emission from vehicles is the biggest contribution for Pd contamination in soil at study area. The solubility of Pb in soil sample at study was investigated by using sequential extraction method which suitable for tropical soil. Higher Pb concentrations in the exchangeable fraction were found in most of the studied soils, compared to other fraction. Therefore, it can be concluded that Pb concentrations in potentially mobile phases are considerable.

Biodegradation Potential of *Rhodococcus Erythropolis*: From Laboratory Experiments to Industrial Applications

Cejkova Alena

Professor, Institute of Chemical Technology in Prague, Czech Republic

Rhodococcus erythropolis disposes wide biodegradation potential to aliphatic and aromatic organic compounds. We prepared physiologically adapted strains able to utilize aniline, phenol and some of its derivatives (catechol, p-cresol, resorcinol, 4-hydroxybenzoate, hydroquinon, p-chlorophenol) as sole sources of carbon and energy. Phenol biodegradation proceeds in this case by the ortho-pathway, the first step involves conversion of phenol to catechol, catalyzed by an intracellular FAD-dependent monooxygenase with co-enzyme/co-substrate NADPH (phenol hydroxylase - EC 1.14.13.7). A recombinant strain with higher and stable level of phenol hydroxylase activity was constructed by cloning of the phenol hydroxylase operon pheA2A1R in the multicopy plasmid pSRK21. Biodegradation activities of the adapted and modified strains were compared. Biodegradation rate of phenol in course of exponentially growth phase of the suspension populations was 0.006 g L-1 h-1 for the adapted strain and 0.013 g L-1 h-1 for the recombinant strain. The strain adapted to aniline reached stable growth in the basic salt medium containing 2.0 g l-1 of this pollutant. All strains were able to colonize hydrophobic (polyethylene, polypropylene, silicon rubber) and hydrophilic (glass) carriers. Prepared biofilm catalysts reached up to twice biodegradation rates in comparison with suspension populations. The aniline degrader proved the best colonization of commercial carrier AnoxKaldnes-K1. Biodegradation efficiency of prepared biocatalysts was investigated under standardized conditions in laboratory biofilm reactor. Results from laboratory experiments were verified in continuous pilot plant where industrial aniline polluted wastewater was applied. Efficiency of the fluidized bed reactor (100 L, carrier with R. erythropolis biofilm) expressed as biodegradation of dissolved organic compounds was 90 % at residence time of 6 days. The acquired data was used for design of industrial facilities. The suggested process of wastewater treatment consists of 2 biofilm fluidized bed reactors (each 260 m3) enabling variable control.

Distribution of Volatile Products during Slow Pyrolysis of Lignites

Muammer Canel
Professor, Ankara University, Turkey
Zarife Misirlioglu
Professor, Ankara University, Turkey
Esin Canel
Ankara University, Turkey
Levent Ballice
Ankara University, Turkey

The pyrolysis of solid fuels especially coals plays an important role in most conversion processes such as carbonization, liquefaction, combustion, and gasification. The first stage of coal combustion is known as devolatilization or pyrolysis. Pyrolysis products are influenced by type or rank of coal, and the temperature and contact time of evolved vapors with the heated surfaces within the reactor.

As a developing country the energy and chemical raw material needs of Turkey are critical concerns. The crude oil and natural gas reserves of the land are minor. The primary potential energy resources are solid fuels such as lignite, bituminous coal and oil shale. Lignite is the dominant sources of energy produced in Turkey and which are used mainly (about 75 %) for power generation in thermal plants. Turkey has very abundant lignite reserves with a total of 8.4 billion tons. Most of the Turkish lignites, approximately 68 %, are poor quality and contains considerable amounts of sulphur. For this reason, converting of lignites into valuable liquid and gaseous compounds is important in using this solid fuel. Knowledge of the lignite pyrolysis is very important for design and control of pyrolysis reactors.

Two lignite samples from Turkey were chosen for experimental work involved in this study. The lignite samples were Uzunköprü/Edirne and Ermenek/Karaman. Lignite samples have been pyrolysed under defined conditions (heating rate 2 K/min, end temperature 550 oC) and the temperature effect on the product distribution was studied by GC and TGA. The temperature has remarkable effect on the product distribution and product evolution rate. A fixed bed reactor was used to pyrolysis of small amount lignite samples and the organic volatile products released from the reactor were collected in a special sampling technique and analyzed by capillary gas chromatography (GC). The main components in organic volatiles were n-paraffins and 1-olefins. They were classified according the C-number. n- paraffins consist mainly of low- molecular weight fraction (C1-C4) and high molecular weight fraction such as C16+. The maximum product formation rate has been obtained approximately at 440 oC for both of the samples. The n-paraffins formation rate was higher than that of 1-olefines at each temperature. The hydrocarbons produced by pyrolysis of Ermenek and Uzunköprü lignite contained 44.1 wt % and 24.1 wt. % n-paraffins at maximum formation rate, respectively. The 1-olefins determined at the

maximum product released temperature were found 11.8 wt %and 7.4 wt % for same lignite samples, respectively. Methane is the main component of gas paraffins. The fraction of methane in gas paraffins is 34.5 wt % and 16.1 wt % at the same temperature for the same lignites, respectively.

Degradation of Halogenated Organic Pollutants by Sequential Nano-bio Redox Processes

Yoon-Seok Chang
Professor, Pohang University of Science and Technology, South Korea
Kumarasamy Murugesan
Professor, Pohang University of Science and Technology, South Korea
V. Bokare
Professor, Pohang University of Science and Technology, South Korea

Persistent organic pollutants (POPs) are a group of organic halogenated pollutants that persist in the environment, and a major concern worldwide. Halogenated flame retardants, plasticizers and antimicrobials are being considered as emerging POPs. As POPs bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment, the elimination of POPs from environmental matrices is one of the priority issues. Bioremediation, a feasible way to remediate the ubiquitous pollutants, is limited to only low halogenated POPs compounds as highly halogenated POPs are extremely resistant to microbial remediation. Thus alternative strategies are required for rapid dechlorination of POPs. Zero-valent iron (ZVI) mediated dehalogenation is a well known process for dehalogenation of chlorinated pollutants. However, it does not destroy the aromatic structure and the resulting product(s) themselves are toxic compounds. Integration of reductive dehalogenation and microbial process could result in complete mineralization of POPs.

In this study, we developed an integrated sequential reduction-oxidation method for degradation of emerging POPs like brominated diphenyl ethers (BDEs) and triclosan (TCS), an antimicrobial compound, and proposed the intermediates and degradation pathways. Reductive dechlorination of these pollutants was achieved with ZVI nanoparticles (nZVI) or palladium coated –ZVI nanoparticles (Pd-Fe0) and subsequent aerobic oxidation was achieved by microbial or enzymatic process. For BDEs dehalogenation, 2,4,4'-triBDE, 2,4,6-triBDE and deca-BDE were employed for the debromination process with nZVI which resulted in debrominated compounds such as mono-BDEs and di-BDEs. Subsequent aerobic treatment with Sphingomonas sp. PH-07 resulted in bromophenols and other prospective metabolites. For antimicrobial compound TCS, dechlorination was achieved with palladium doped iron nanoparticles (Pd-Fe0), with generation of 2-phenoxyphenol as the dead-end product. Sequentially, 2-phenoxyphenol was then aerobically transformed in two different ways using either microbial or enzymatic process. In microbial process, Sphingomonas sp PH-07 was employed which resulted in complete degradation of 2-phenoxyphenol. In enzymatic process, Trametes versicolor laccase (EC 1.10.3.2) was employed with or without redox mediator system. In the presence of natural redox mediator syringaldehyde, diphenyl ether linkage of 2-phenoxyphenol was cleaved and produced oligomeric or polymeric products. The bacterial growth inhibitory test showed that toxicity of TCS and 2-phenoxyphenol was effectively decreased by

sequential redox processes. The integrated nano-bio redox process could be applied as effective remediation strategy for other highly halogenated POPs.

Treatment of Pharmaceutical Wastewater Containing Macrolide Antibiotic Tylosin in a Sequential Anaerobic-Aerobic Reactor System

Shreeshivadasan Chelliapan
Lecturer, University Technology, Malaysia
Paul Salis
Lecturer, University Technology, Malaysia
Ali Yuzir
Lecturer, University Technology, Malaysia

Wastewaters produced from pharmaceutical industries, such as antibiotic manufacture and formulation, generally contain high levels of soluble organics, many of which are recalcitrant (Schroder, 1999). If these compounds are not removed by one-site treatment they will be discharged to sewage treatment plants (STPs) where they may disturb the biological process and the microbial ecology, and potentially affect receiving surface waters. Typically, pharmaceutical wastewater is characterized by high COD concentration, some pharmaceutical wastewaters having a COD as high as 80,000 mg.L-1 (Nandy and Kaul, 2001). Most published studies have investigated the removal of COD but ignored antibiotic removal during treatment. Although high COD removal efficiencies have been achieved, biological treatment is sometimes ineffective in the removal of antibiotics under some circumstances (Adams et al. 2002; Saravanane et al. 2001b). It is therefore important to investigate antibiotic degradation associated with COD removal in wastewater treatment processes.

For industrial wastewater treatment, an anaerobic process is often applied to reduce of the major part of the COD load, which is then followed by an aerobic treatment to oxidize the residual COD in the wastewater. This is because effluent from the anaerobic bioreactor usually has substantial amounts of residual COD even if its removal efficiency is above 90% (Zhou et al. 2006). Therefore, direct discharge to the environment immediately after anaerobic treatment is rarely permitted, and post-treatment by an aerobic process is usually necessary. According to Field et al. (1995), an aerobic polishing step was required for complete mineralisation of aromatic amines and chlorinated aromatics treated by anaerobic digestion. In addition, process optimisation can be achieved by the use of a sequential anaerobic-aerobic treatment system, particularly when treating highly recalcitrant wastewaters (van Lier et al. 2001). Despite these considerations, there is a limited number of experimental studies investigating the treatment of pharmaceutical wastewaters in an anaerobic-aerobic reactor systems (Fox and Venkatasubbiah (1996); Buitrón et al. (2003); Zhou et al. (2006); Sponza and Demirden (2007).

Tylosin is a macrolide antibiotic produced by a strain of Streptomyces fradiae. It has good anti-bacterial activity against most pathogenic gram-positive bacteria, and some gram-negative bacteria, vibrio, spirochete, coccidian, etc. It is one of the first-choice drugs against infections caused by mycoplasma.

The aim of this study was to investigate treatment of pharmaceutical wastewater that contains Tylosin in a sequential Up-Flow Anaerobic Stage Reactor (UASR) and Porous Membrane Activated Sludge Reactor (PMASR). The more specific objectives of this research were to assess the stability of reactor for measured parameters (e.g. COD and TOC removal) and to investigate the efficiency of Tylosin reduction in the UASR-PMASR system. To date, there is no reported study on the treatment of pharmaceutical wastewater containing macrolide Tylosin by a sequential anaerobic–aerobic reactor system.

Hospital Waste Management in Samsun, Turkey

Semra Coruh
Associate Professor, Ondokuz Mayis University, Turkey

Hospital waste carries a higher potential for injury, infection and environmental pollution than any other type of healthcare waste. The World Health Organization (WHO) defines hospital solid waste as any solid waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in research pertainning thereto, or testing of biological, including but not limited to: soiled or blood-soaked bandages, culture dishes and other glassware.

Hospital waste management is an imparative environmental and publich safety issue, due to the waste's infectious and hazardous character. In many countries, hazardous and medical wastes are still handled and disposed together with domestic wastes, thus creating a great health risk to municipal workers, the publich and environment. Some of the health impacts originating from exposure to hazardous hospital wastes include mutagenic, tetragenogenic and carcinogenic effects, respiratory damage, central nervous system effects, reproductive system damage and others. The generation of hospital waste differs not only among the countries but also within the same country by type of establishment, proportion of reusable items used and proportion treated on an out patient basis. According to WHO, the generation of hospital waste is dicerctly proportional to the income level, similar to the trend of MSW generation the report repsents the range of hospital waste generation rates among the countries. Design of equipment for strage, disposal and treatment of hospital wastes requires the determination of the amount of wastes in particular groups. The indices of waste storage are determined on the basis of long systematic studies which provide an outlook on the amount, seasonal fluctuations and the growth rate of waste storage over years.

Ondokuz Mayıs University Hospital is situated in the University campus area which is about 15 km west of the city center of Samsun. The hospital has 1200 beds together with the children units. The number of the medical and non-medical staff of the hospital is about 1950. All essential medical sections are active in the hospital.

In the present study the waste mangement of the hospital were examined and possible modifications were suggested. The composition of the medical and non-medical wastes originated from the individual units of the hospital including administrative and educational areas were analyzed and grouped according to the national instructions.

The present study examines the existing waste strategy of a typical hospital in Ondokuz Mayıs University, Samsun with a bed capacity of 900-1000. The segration, collection, packaging, storage, transportation and disposal of waste were monitored and the observed problematic areas documented.

Unused Medicine's Toxic Outcomes Mediated by Ecological Pharmacology Influencing Health Policy

Contrad Dhing

Associate Professor of Social & Administrative Sciences, Husson University, School of Pharmacy, USA

In 2007, The Athens Declaration summarized a taxonomy of reasons to address unused medicine across the world. Subsequently the Governor of the State of Maine in the US issued three consecutive Proclamations drawing attention to these reasons. A fourth Proclamation encouraged the development of cross departmental, cross agency, and private public partnership to address safe medicine use from a lifecycle approach addressing risk benefit and safe use of medicine in harmony with the Athens Declaration. Subsequently, starting in September 2009, the State Medicaid pharmacy program initiated a phased-in maximum of 15 days for first prescriptions of a number of classes of pharmaceuticals. Response to this phased approach will be discussed, complications identified to date noted; prescribing data before and after will be reviewed. A classification of drugs using the Stockholm County Council system will be shown and environmental impact of decrease in waste and discarding will be outlined. A set of metrics will be proposed to assess outcome of this policy. The perspective of a State Medical Director on the environmental integrations of a number of state agencies and departments for policy cohesion and actual improvement in care will be given.

Low Temperature Hydrogen Production from Ethanol over Cerium and Nickel based Oxyhydrides

Louise Duhamel-Jalowiecki
CNRS Researcher, Université des Sciences et Technologies de Lille, France
C. Pirez
Ph.D. Student, Université des Sciences et Technologies de Lille, France
Mickael Capron
Associate Professor, Université des Sciences et Technologies de Lille, France
F. Dumeignil
CNRS Researcher, Université des Sciences et Technologies de Lille, France

The potential benefits of a hydrogen economy coming from renewable energy sources are creating a large consensus. In theory, hydrogen production from biomass can be a carbon-emission free process, and ethanol lends itself to a well distributed-production strategy. Hydrogen production from ethanol was investigated over cerium nickel CeNiXOY ($0 < x \leq 5$) mixed oxide catalysts. Steam reforming and oxidative steam reforming of ethanol were studied. 100% of ethanol conversion is obtained at 400°C. However, an interesting stable activity i.e. ethanol conversion and H2 selectivity can be obtained at very low temperature (200°C) when the solid is previously in-situ treated in H2 at 250°C. Adding O2 allows increasing ethanol conversion at low temperature. The good results obtained are related to the fact that after such a treatment the solids studied become catalytic hydrogen reservoirs, called oxyhydrides, with the presence of hydrogen species of hydride nature in the anionic vacancies of the solid. Different physicochemical techniques, including XPS, ion sputtering, XRD, TPR, TGA were used to characterize the catalysts. The active nickel species belonging to the small clusters and/or to the solid solution, participating actively in the catalytic reaction, present the characteristic of being able to be reduced and reoxidized easily and reversibly (redox process), allowed by their close interaction with Ce species. Correlations among the species present in the solid and the catalytic performances are discussed. An active site based on the formation of anionic vacancies and a mechanism involving a heterolytic abstraction of a hydride species from ethanol are envisaged.

Effect of Environmental Pollution on Genome and Biochemical Characteristics of *Chironomus Riparius Mg.* (Chironomidae, Diptera), Collected from Bulgarian and Turkish Aquatic Basins

M. Duran
Lecturer, University of Pamukkale, Faculty of Science & Arts, Department of Biology, Turkey
E. Karadurmus
Lecturer, University of Hitit, Faculty of Engineering, Department of Chemical Engineering, Turkey
P. Michailova
Institute of Zoology, Bulgarian Academy of Science, Bulgaria
J. Ilkova
Institute of Zoology, Bulgarian Academy of Science, Bulgaria
A. Sen
University of Pamukkale, Faculty of Science & Arts, Department of Biology, Turkey
R. Berber
University of Ankara, Faculty of Engineering, Department of Chemical Engineering, Turkey

In an aquatic basins most environment contaminants accumulate in the sediment where they are directly toxic to benthic animals. *Chironomus riparius* due to many advantages (widely distributed, exellent salivary gland chromosome) is the chironomid species most commonly employed in genotoxicological studies. Analysis of trace metals in sediment of Chaya River (Asenovgrad, Bulgaria), Derincay River (Turkey), pool in Chorum (Ömerbey fountain,Turkey) showed higher concentrations of trace metals (Pb, Cr, Cu, Mn) in comparison with reference data. The genome of *C. riparius* (2n = 8, with chromosome arm combinations: AB, CD, EF and G and three Balbiani rings (BRs) and Nucleolar Organizer (NOR) in chromosome G) is very sensitive to the contaminants in studied aquatic environment. The response of *C. riparius* genome to environmenal pollutions is characterized by changes of gene expression of key structures (BRs and NOR) and increased in somatic aberrations. Changes of gene expression are indicated by decreasing the puff activity of BRs and NOR: very often they occurred in intemediate state of activity or BRs are in collapes. In samples of *C.riparius* from polluted pools Chorum, Derincay River, and Chaya River somatic rearrangements were in 21.52%, 32.40%, 27.75% of the studied cells respectively. In all cases they were significantly higher than those of the control (Chorim pool: $G = 34{,}378$, $P<0.001$; Derincay River: $G = 58.741$, $P< 0.001$; Chaya River: $G = 47.741$, $p<0.001$). Somatic index was the highest in sample from Derincay River (8.29), following by Chaya River (7) and pool in Chorum (6.30).

The response of the *C. riparus* to the environmental pollutants are also measured by following the changes in biomarker activities such as ethoxyresorufin O-deethylase (EROD), Acetylcholine esterase (AChE), glutathione S-transferase (GST) and

metallothionenin (MT). The EROD, GST, AChE, and MT activites of polluted Derincay=(Chorum) are 7.9, 1.64.0.62 1.0 respectively. While their activity is much less in Asenovgrad as 3.27, 1.41, 0.92, 0.92 respectively. The greater levels of EROD suggest that Derincay are more heavily polluted with PAH and halogenated hydrocarbon-type pollutants than Asenovograd.

So, the observed genome and biohemical alterations could be considered as an early warning signals for contaminants of aquatic environment.

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Microbial Ecology as Affected by *in-situ* Phosphate-based Stabilization Treatment in Lead (Pb)-Contaminated Soil

John Yang
Professor, Lincoln University of Missouri, USA
Frieda Eivazi
Professor, Lincoln University of Missouri, USA
Chuanlun Zhang
Professor, University of Georgia, USA

In-situ phosphate treatment is being proposed as a potential cost-effective remedial alternative for reducing human health and ecological risks associated with soil Pb contamination. The impacts of the treatment on soil microbial community are largely unknown and little studied, which is critical for the technology to be publicly accepted and widely deployed. Urban and mine soils, containing about 4000 mg Pb kg-1 from the Jasper County Superfund Site, southwest Missouri, were treated with a soluble phosphate as H3PO4 at rate of 1% in both laboratory and field conditions. The treated soils were sampled 2 months and 2.5 years post treatment, respectively, and analyzed for microbial properties. The characterization included: microbial biomass using fumigation methods; microbial community & diversity with the BioLog identification and the PCR-DGGE technique followed by UPGMA; soil microbial toxicity by a bacteria-based toxicity assay; and selected enzyme activity by acid/alkaline phosphatase assays. The phosphate treatment has shown to substantially increase microbial biomass in the soil as compared with untreated soil. The PCR-DGGE analysis indicated that number and intensity of the bands in the profiles increased significantly due to treatment, suggesting more diverse sequences and higher biomass. There were little adverse impacts of the treatment on the enzyme activities. Enhanced microbial diversity and biomass were accompanied with lower soil microbial toxicity as indicated by the toxicity assay. This study illustrates that H3PO4 treatment that chemically stabilizes soil Pb would be environmentally sound and sustainable by decreasing metal toxicity to soil microorganisms and facilitating microbial diversity and growth with desirable soil conditions.

Analysis of the Refrigeration System Retrofitting Procedure on Environment

Orhan Ekren
Instructor, Ege University, Turkey

In this study, techno-economic evaluation of retrofitting a fixed speed refrigeration system to the variable speed was investigated. During the retrofitting process fuzzy logic control algorithm was used for compressor speed and opening percentage of electronic expansion valve (EEV). The main aim of this study is to analyses retrofitting cost such as adding an inverter, an electronic expansion valve and new control algorithms versus increase efficiency of the refrigeration system and energy saving. Current refrigeration system has an air cooled condenser, a shell and tube liquid evaporator, and a vertical scroll compressor. Environmentally friend refrigerant R134a was used in the system. Refrigeration systems are designed for working at maximum load conditions; on the contrary, these plants work under partial load conditions most of their life cycle. Refrigeration capacity modulation methods, such as variable speed compressors, allow to match continuously the compressor refrigeration capacity to the load, determining an energy saving according to on/off control. In this study, compressor speed was controlled with fuzzy logic algorithm according to evaporator water output temperature and EEV opening percentage was controlled with fuzzy logic algorithm according to refrigerant superheat value at outlet of the evaporator. Compressor speed has been changed between 30 and 60 Hz. and EEV opening percentage has been changed between 10 and 45% of the maximum opening percentage. In fact, the refrigeration plant was operated as on/off at 50 Hz fixed speed by a thermostat. During the study, it has been operated as variable speed by adding PWM inverter. In the present study, fuzzy logic controlled variable speed chiller system exhibited 17% coefficient of performance increase according to the thermostatic controlled fixed speed system. Techno-economic evaluation was done for this energy saving amount also payback period of the retrofitting procedure was calculated. Furthermore, environmental profits of the retrofitting have been evaluated.

Removal of Ag+ ions from Aqueous Solutions Using Fly Ash: Full Factorial Design Approach

Sermin Elevli
Lecturer, Ondokuz Mayis University
Semra Coruh
Associate Professor, Ondokuz Mayis University, Turkey
Gaye Senel
Lecturer, Ondokuz Mayis University, Turkey
Osman Nuri Ergun
Lecturer, Ondokuz Mayis University, Turkey

Heavy metals have been excessively released into the environment due to rapid industrialization and have created a major global concern. One of the most important heavy metal is silver. The major industrial use of silver is as silver halide in the manufacture of photographic film. Other industrial uses of silver include the production of electrical contacts and switching gear, batteries catalysts and mirrors. Conventional methods applied to the treatment of industrial effluents include chemical precipitation, chemical oxidation or reduction, filtration, ion exchange, electrochemical process, evaporative recovery, reverse osmosis and membrane technologies. Among the available techniques, adsorption technology has been used as one of the most practical methods. In recent years considerable attention has been devoted to the study of removal of heavy metal ions from solution by adsorption using some industrial and agricultural wastes or by-products. Successful results have been obtained by using powdered aluminum oxide, slag, waste wool, sawdust, ashes, red mud, phosphogypsum, amorphous calcium silicate and iron oxide. In this study, fly ash has been investigated for the removal of silver from aqueous media.

Fly ash (FA), a waste material originating in large quantities from modern power stations, is composed of metallic oxides, silicates and other particulate matter. Fly ash has been increasingly utilized in construction application, such as fills, concrete, pavements, wastewater treatment, landfill barrier material, grouts and others. The utilization of fly ash as adsorbent for heavy metals removal from industrial wastewater could be rewarding to both environment and economy.

The purpose of this study is to investigate the adsorption of silver on fly ash from aqueous solutions using 23 full factorial designs. Factorial design of experiments is employed to study the effect of three factors contact time (30 and 120 min.), initial metal concentration (50 and 250 mg/l) and adsorbent dosage of the fly ash (1.25 and 20 g/l) at two levels low and high. The results showed that initial metal concentration is the most significant factor that affects the removal of Ag+. The principal effect of contact time did not show a high statistical significance.

Groundwater Pollution by Trichloroethylene: Transport Mechanisms and Environmental Fate

Alessandro Erto
Researcher, Università di Napoli Federico II, Italy
Amedeo Lancia
Researcher, Università di Napoli Federico II, Italy

The presence of xenobiotic compounds into groundwater represents a serious threat for living beings and environment, due to high toxicity levels and persistence that enhances the diffusion into the environment itself. A thorough comprehension of the transport and diffusion of pollutants from groundwater to surrounding environment can be achieved only through an accurate analysis of the main chemical and physical properties of the pollutants (density, vapor pressure, water solubility, partition coefficient, viscosity, ecc.). As a matter of fact, these properties can determine the occurrence of transport phenomena among natural phases and, hence, they can be used to predict the environmental fate of the pollutants.

The present work aims at an analysis of chemical and physical mechanisms of trichloroethylene (TCE) repartition among environmental phases from polluted groundwater. Starting from this analysis, an experimental study has been performed to investigate the thermodynamic properties influencing water-soil and water-air equilibria. For this purpose, adsorption on natural soils and volatilization phenomena, both considering synthetic groundwater, have been studied.

The determination of TCE Henry constant (H) has shown that the TCE tendency to transfer from water to air is enhanced in mineral water (H=569 atm) with respect to distilled water (H= 500 atm).

Moreover, adsorption tests on pozzolana and yellow tuff soils have shown the concrete possibility of a TCE migration from water to soils. The adsorption capacity of pozzolana towards TCE proved to be the highest, probably as a consequence of its greater organic content.

An overall analysis of experimental data shows that, even if TCE has a high volatility, a density higher and a viscosity quite lower than water promote its vertical movement down towards groundwater, under gravitational field. In those conditions, the absence of light prevents photolytic phenomena, the high pressure reduces the volatility and the affinity towards organic soils determines sorption phenomena, testifying the strong inter-correlation between chemical and physical properties and environmental fate.

Implementation of Solar Thermal Power in Spain

Inmaculada Fernandez
Assistant Lecturer, Cantabria University, Spain
Carlos J. Renedo
Assistant Lecturer, Cantabria University, Spain
Severiano Perez
Assistant Lecturer, Cantabria University, Spain

The fossil fuel consumption in human activities emit greenhouse gases such as carbon dioxide (CO2) and methane (CH4) which hinder the log wave terrestrial radiation to escape into space and consequently, the earth troposphere becomes warmer.

This phenomenon has to be reduced through the replacement of fossil fuels by renewable energy sources. One of these sources is solar energy which is the most abundant in nature. Spain is in a privileged position to exploit solar energy due to its geographic location and climate. Each square meter of its surface area receives 1500 kWh of energy. Therefore, the design and development of efficient conversion methods is of vital importance. One of these methods is the solar thermal power generation that consists in capture energy from solar radiation and transforms it into heat. This heat is used in different applications (water heating, space heating and cooling, refrigeration, electricity, furnaces…)

This paper analyzes the generation of thermal solar power in Spain where this kind of energy has undergone an increase in latest years. This increase is as result of a recent commitment made by many regional and Spanish Governments to reduce CO2 emissions, energy dependence and develop national industry through the development of normative and major projects.

The paper collects the main thermal solar thermal power plants built in Spain as well as some of their principal characteristics and the future objectives for this kind of plants.

Removal of Contaminants in Runoff Water by Constructed Wetlands

Jay Gan
Professor, University of California, USA
Robert Budd
Department of Pesticide Regulation, Sacramento, USA
Anthony O'Geen
University of California, USA

In areas of intensive agriculture such as the Central Valley of California, pesticides, nutrients, and other contaminants in irrigation return flows (tailwater) contribute to water quality degradation of local streams and tributaries. Given the non-point source nature of such pollutions, flow-through wetlands represent one of the most feasible mitigation options. We systematically evaluated the performance of two wetlands for their removal of commonly used insecticides including pyrethroids, diazinon and chlorpyrifos over two irrigation seasons under field conditions. Water samples were collected biweekly at multiple locations throughout the wetlands. Accumulated sediments were sampled using sediment traps. Analysis of pesticides showed that both wetlands were highly effective in removing pyrethroid compounds such as permethrin, cypermethrin, cyhalothrin, and bifenthrin. Removal of these compounds was mainly mediated through sedimentation caused by gravity and vegetative filtration. When reductions in both flow volume and concentrations were considered, the seasonal average removal of pyrethroids was 95-100%. The removal was also >90% for chlorpyrifos, but was limited for diazinon. Additional experiments showed that pesticides retained in the wetlands underwent degradation under flooded conditions, but they were relatively persistent between the irrigation seasons when the wetlands were dry. Results from this study clearly suggest that flow-through wetlands, when properly designed, are an effective approach for mitigating hydrophobic contaminants in agricultural runoff water. However, long-term effects of wetlands due to potential contaminant build-up should be considered before this practice is widely promoted.

Indicator and Dioxin-like Polychlorinated Biphenyls in Air of Background Area in China

Lirong Gao
Associate Professor, Chinese Academy of Sciences, China
Jiajia Wu
Associate Professor, Chinese Academy of Sciences, China
Minghui Zheng
Chinese Academy of Sciences, China
Qiang Fu
Environmental Monitoring of China, China

Polychlorinated biphenyls (PCBs) are well known persistent organic pollutants (POPs) because of their toxicity, bioaccumulation, and resistance to environmental degradation. Due to their persistence, PCBs have remained major global pollutants, with numerous investigations reporting their continued and ubiquitous presence in the global atmosphere. Extensive measurements of PCBs in the atmosphere involving multiple sampling sites and multi-year time periods have been performed in the Great Lakes region and the Canadian Arctic. However, relatively little is known about levels and patterns of PCBs in background air in China. In order to know the levels and transport of PCBs in China, the concentrations and distributions of PCBs in eleven background air sampling locations in China were analyzed. High volume samplers with a size-selective inlet for collecting only those particles smaller than 10 micrometers diameter were used to sampling air. Air sampling were duplicate carried out for 4 days and about 1300 m3 volumes of samples were collected in September to November 2008.The samples were pretreated and analyzed followed by USEPA method 1668A. The results show that the concentrations of dioxin-like PCBs ranged from 0.4 to 10.6 fg WHO-TEQ/m3. The concentrations of dioxin-like PCBs were 7.2-42 fg WHO-TEQ/m3 in air of Korea collected in 2004. So the concentrations of dioxin-like PCBs in China were lower than those in Korea. The levels of indicator PCBs were between 10.2 and 54.8pg/m3. CB28 and CB52 were the predominate congeners in all the air samples.

Removal of Dyes from Aqueous Solution by Adsorption onto Red Mud

Semra Coruh
Associate Professor, Ondokuz Mayis University, Turkey
Feza Geyikci
Associate Professor, Ondokuz Mayis University, Turkey
Osman Nuri Ergun
Associate Professor, Ondokuz Mayis University, Turkey

Environmental compliance requirements have become increasingly difficult to attain in both wastewater discharge and chemical handling. Discharge of wastewater into natural streams and rivers from the industries using dyes can color large water bodies, which not only affects aesthetic merit but also reduces light penetration and photosynthesis. In addition, many dyes are toxic to some organisms and may cause direct destruction of aquatic communities so some form of treatment is necessary. Conventional wastewater treatment plants are not suited to remove the dyes due to their non-biodegradable features. Therefore, alternative methods have been developed to remove the dyes from wastewater, namely, coagulation and flocculation, reverse osmosis, oxidation or ozonation, electro-coagulation and adsorption. These technologies do not show significant effectiveness and economic advantages. Adsorption is the most popular method for wastewater treatment due to its easy and inexpensive operation, but there are certain problems using activated carbon as adsorbents due to the high cost of use and regeneration. The adsorption process will provide an attractive technology if the sorbent is inexpensive and ready for use. Thus, many investigators have studied the feasibility of using low cost substances, such as perlite, biomaterial, recycled alum sludge, zeolites, clay, agricultural waste residues, bagasse fly ash, peanut hull, peat and bean waste for removing the dyes from wastewater.

Red mud is a waste material formed during the production of alumina when the bauxite ore is subjected to caustic leaching. During production in the Konya Seydişehir Aluminum Plant, Turkey, approximately 40 % of the processed bauxite ore becomes waste with the major contents of Fe_2O_3, Al_2O_3, SiO_2, Na_2O, TiO_2, CaO as well as minor contents of V, Ti, Zr; Se, etc. The grain size was mostly (>93%) less than 10 μm. It is a brick red colored highly alkaline (pH 10-12) sludge containing mostly oxides of iron, aluminum, titanium and silica. Thus, several studies have reported that red mud can be utilized for adsorbing dye, heavy metals (e.g., As, Cr, Cu, Zn, Pb, Cd), and anionic pollutants from water, including phosphate, fluoride and nitrate.

In this study, a typical basic dye, methylene blue, was selected for adsorption test because it is an important dye widely used for printing, textural dyeing and medicinal

purpose. The scope of this paper is to examine the adsorption of basic dye, methylene blue, onto red mud, which is a lowcost adsorbent for the removal of dyes.

Environmental Degradation of China Near-shore Waters and Countermeasures

Zhen-Ren Guo
Professor, South China Institute of Environmental Sciences, China

China is a big country with a very long coastline where is usually most populated. Along with rapid economic growth in past decades, water environment of coastal and estuarine areas has been significantly affected.

The first change of near-shore environment is water pollution. This paper reports water quality status of the coastal waters with an emphasis on southern China coast that covers near-shore waters of Guangdong, Guangxi and Hainan Province. Many pollution problems are related to COD, nitrogen, phosphorus and oil. Discussion on current water quality and water quality evaluation in recent years focuses on the parameters of these major pollutants. Reasons causing water quality change including water quality improvement in some local areas as well are analyzed.

The second change of near-shore environment of China is degradation of marine ecosystem. The paper presents current status and historical changes of special marine habitats such as mangroves, seagrass beds and costal wetlands in China or southern China. Economic losses due to habitat degradation and water pollution are estimated.

In order to reverse the trend of environmental degradation in China coastal zones, a great effort has been made by China central government and local governments. This paper briefs the countermeasures practiced in China in management and technology aspects. On management aspect, the most important elements include legal framework, organizations and their responsibilities from the central to the local, the governmental and the non-governmental, defined by the law. More discussions in this paper are given to technical aspect, such as the engineering ways to reduce pollutant discharges to the sea and the series of relevant standards, the methodologies for total pollutant load control, and the engineering ways to protect and restore coastal ecosystems.

Finally, the paper discusses shortages on coastal environmental protection in China. These shortages, problems and needs indicate the direction of our future efforts.

Pilot-scale Cross-flow Anaerobic Baffled Reactor (CABR) for Treatment of Dye Wastewater and Performance Evaluation Based on Generalized Grey Relational Analysis

Zhi-Xin Qi
Master Student, Harbin Institute of Technology, China
Nan-Qi Ren
Professor, Harbin Institute of Technology, China
Wan-Qian Guo
Lecturer, Harbin Institute of Technology, China

A pilot-scale six-compartment cross-flow anaerobic baffled reactor (CABR) with effective volume of 18 m3 was used to treat dye-containing wastewater. The CABR system was able to treat the wastewater efficiently after FeSO4 pre-treatment, as indicated by removal efficiencies of 32.8 % for chemical oxygen demand (COD), 49.5 % for suspended solid (SS) as well as 22.5 % for sulfate (SO42-) during operational period of 74-107 days. Additionally, the BOD520/COD value of the treated effluent from CABR could be increased by 15 % on average, which indicated a satisfactory biodegradability improvement of the wastewater. Gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) analysis showed that the concentrations of alkanes, amides, organic acids, ketones, phenols and esters were much lower in the effluent than those in the influent. Many high-molecular-weight compounds such as cyclanes, quinolines and phenols were successfully transformed to low-molecular-weight ones. In particular, the CABR revealed good performance to eliminate dye materials like Naphthol AS-E, azo dyes-acid orange, direct blue and anthraquinones-acid blue. As illustrated from the results of generalized grey relational analysis (GGRA), COD removal efficiency was more closely associated with flow rate, organic loading rate (OLR), water temperature and influent SS among the whole selected possible factors. Based on the overall treating effectiveness and the GGRA study, the optimized operation strategy of the dye wastewater was obtained as the hydraulic retention time (HRT) of 12 h for steady-state operation, upflow velocity of 1.9 m/h as well as OLR of 1.5~ 2.0 kg COD/m3/d.

Exploring China's Offshore Wind Energy Potential in a Comprehensive Perspective of Technological, Environmental and Economic Constraints

Lixuan Hong
Ph.D. Student, Aalborg University, Denmark

Adequate recognition of offshore wind energy potential may have far-reaching influence on the development of future energy strategies. This study aims to investigate available offshore wind energy resource in China's exclusive economic zones (EEZs) with the aid of a Geographical Information System (GIS), which allows the influence of technological, environmental and economic constraints on raw offshore wind potential being reflected in a continuous space. Firstly, based on ocean wind speed data from satellite QuikSCAT, raw potential are identified. Those findings are then used along with projections of wind turbine technology development to calculate the maximum amount of offshore wind energy that could be generated in 2020 and 2030(the technological potential). Secondly, to calculate 'environmental constrained potential', national natural reserves are excluded from the calculation of offshore wind energy potential. Spatial competitions and conflicts from shipping routes, oil and gas exploration and tourist zones are considered as environmental constraints for the available offshore wind energy as well. Thirdly, a bottom-mounted GIS based cost model for offshore wind energy farms is established. When combined with cost reduction prospects for future offshore wind farms, economic potential in 2020 and 2030 can be calculated and showed across wide regions. The results of the study can serve as a foundation for future policy-making. More detailed assessments at regional or local scale are needed for decisions on developing offshore wind farms.

Waste Management Planning in Petrochemical Industries Located at Pars Especial Economic Energy Zone

Mohammad Taghi Jafarzadeh Andebil
Ph.D., Manager of Environment, National Iranian Petrochemical Company, Iran
M. Abbasi
Ph.D. Student, University of Tehran, Iran
M. Mirabi
Ph.D., Power and Water University of Technology, Iran
M.A. Abduli
Professor, University of Tehran, Iran

Relationships between Grain Yield and Flag Leaf Chlorophyll Content of Iranian Wheat Cultivars under Drought Stress and Non-stress Conditions

Mohammad Esmailpour Jahromi
Ph.D. Student, University of Tehran, Karaj,
Jahrom Higher Education Complex, Jahrom, Iran
Ali Ahmadi
University of Tehran, Iran
Mehdi Joudi
University of Mohaghegh Ardabili, Iran
Hamid Mohammadi
University of Tehran, Iran

With global warming, evapotranspiration is likely to increase and drought could occur more often over the world as well. The aim of the present study was to investigate possible relationship between flag leaf chlorophyll content as one of the important traits determining photosynthesis capacity and grain yield of 81 different Iranian wheat cultivars under drought stress and non-stress conditions. Field experiments were carried out at University of Tehran research farm under both conditions during 2007-2008 growing season. Drought stress was imposed when plants were at heading stage by withholding watering. In each plot, flag leaf chlorophyll of 20 random wheat plants were measured using SPAD 502 chlorophyll meter at two weeks after anthesis. Results showed that wide genetic diversities exist for flag leaf chlorophyll content among cultivars, offering excellent scope for genetic manipulation. There was significant positive correlation between grain yield and flag leaf chlorophyll under non-stress conditions. However, no correlation was detected between foregoing traits under drought stress condition, suggesting that retaining less leaf area during grain filling period may lessen adverse effects of drought stress due to smaller amount of leaf transpiration.

Characteristics and Management of Electronic Waste in Korea

Yong-Chul Jang
Associate Professor, Chungnam National University, South Korea
M. Kim
Jeju National University, South Korea

In Korea, the generation of waste electrical and electronic equipment (WEEE) or electronic waste (e-waste) has increased rapidly in recent years. The proper management of WEEE has become a major issue of concern for solid waste communities due to the volumes of the waste being generated as well as the potential environmental impacts associated with toxic chemicals found in most electronic devices. The stream of electric waste must be dealt with special attention because of the toxic materials, which can adversely affect the environment and human health, if managed improperly. Environmental regulatory agencies as well as electronic manufacturers (or producers), recyclers, and environmental non-governmental organizations in many countries are interested in updated statistics in regard to how much WEEE is generated, stored, recycled, or disposed. This paper presents an overview of the current management practices and characteristics of electronic waste in Korea. Specifically, the generation rates, collection systems, recycling practices, and recent regulations of electronic waste have been discussed. Recycling has become a major part of WEEE management in Korea because incineration and land disposal options are not generally accepted. Reuse and recycling of electronics conserve energy and recover precious materials used in electronics, as well as reduces the environmental impact of these products. Extended producer responsibility (EPR) program was introduced in 2003 to recycle and effectively manage the waste. In recycling of WEEE, much work to date, however, has mainly focused on the recycling and recovery of materials from limited WEEE categories, especially refrigerators, washing machines, televisions, and air conditioners; only small proportions of electronic devices in the EPR system are currently recycled. Thus, the EPR program needs to expand the EPR category and increase their target recycling rates to create an incentive to remove WEEE from storage. The recycling rates of several products such as computers, mobile phones, printers, and audio equipment are found to be lower than the waste devices above. This results partly from a lack of a sound and solid foundation for developing recovery and recycling techniques of such products. Thus, more efforts should be made for cost-effective recycling technology. Since WEEE recycling can result in one of the greatest economic profits for the recycling industry, it would be valuable to study the potential and the dynamics of the recycling market.

Improving Cost-effectiveness through the Adjustment of Excess air for Furnace and Boiler in a Refinery Plant

Chih-Ju G. Jou
Professor-Director, Diwan University, Taiwan

The decrease of excess air (residual O2 concentration in flue gases) means the airflow rate in the furnace and boiler chamber will go down, resulting in a decrease in the speed of heat transfer from the radiation zone to the convection heating surface zone. The results presented in this paper show that for the furnace decreasing the residual O2 concentration in flue gases from 4% to 3% will save 2.1 × 105 m3 of natural gas consumption, reduce the NOx emission by 44.5% and CO2 emission by 450 tons annually. Meanwhile, for the boiler will raise the boiler relative efficiency by 0.4%, reduce the NOx emission by 4.6% and CO2 emission by 610 tons annually. Hence, the excess air (or oxygen) has been proved to be an important operating parameter in this research to affect both thermal efficiency and environmental impact of a heater furnace and boiler.

Combustion of Animal Fat and Diesel Mixtures in a Burner of Mechanical Pulverization

Juan Antonio Lopez Sastre
Professor, Universidad de Valladolid, Spain
Julio San Jose
Professor, Universidad de Valladolid, Spain
C. Romero-Avila
Professor, Universidad de Valladolid, Spain

This work presents the experimental results of fat combustion with diesel for heating. The work is divided into two parts, the first of which deals with the identification of animal fats as fuels and characterization of diesel as well as determining the chemical and thermodynamic properties of mixtures of both components.

The second part of the work provides a theoretical study of the combustion of the fat analyzed fat, as well as the prepared fat and diesel mixtures of combustion. Once the theoretical studies have been validated, the combustion efficiency and exhaust reduction estimates are compared with experimental results obtained in a boiler.

Waste Heat Recovery-dust Drying Process using Steel Balls as Heat Storage Media

Eiki Kasai
Professor, Tohoku University, Japan

Industries consisted of high temperature processes discharge a certain amount of waste heat in a wide temperature range. In such industries, on the other hand, a large amount of primary energy is still used for drying processes of raw materials and wastes such as wet dust and sludge. In this study, a new drying process was proposed by employing metallic heat storage materials (HSMs) as drying media, which can store waste heat from low to mid temperatures (250-500ºC) as both sensible and latent heats. The process possesses several advantages that the process size and exhaust gas volume are significantly small and heat recovery from a dusty gas is possible.

The cold model experiments understanding the motion of HSM balls and powder inside the rotary dryer and its numerical simulations were carried out. The behaviour of HSM balls was simulated by using the friction coefficient as a fitting parameter. Further, assuming that a HSM ball forms a composite particle with a powder layer, the numerical simulations of its drying process were conducted. They confirmed that, drying time can be shortened significantly when the latent heat was considered. Design of the drying process of wet dust in a practical scale showed that the size of the dryer will be several times smaller than that of a conventional rotary dryer because of higher volumetric heat transfer coefficient between HSM and dusts. Since the heat exchange tower between waste gas and HSM balls is also compact, the proposed process shows a certain potential to be applicable as an actual drying process.

The Economic Value of Water in Korean Manufacturing Industry

Se-Ju Ku
Ph.D. Student, Korea University, Republic of Korea
Seung-Hoon Yoo
Associate Professor, Hoseo University, Republic of Korea
Sun-Young Park
Master's Course Student, Korea University, Republic of Korea

In manufacturing firms, water is essential input in the production process along with labor, capital, etc. Industrial water can be used for cleansing and transporting intermediate inputs, producing steam, producing electricity, sanitation, and for inclusion in the firm's output (as in the food and beverage industries). Therefore, it is quite important for industries to stably secure water.

In the case of Korea, future industrial water use is expected to rise as industrial development continues. The demand of industrial water is 2.60 billion ton per year in 2003 and expected to be 3.18 billion ton and 3.56 billion ton in 2011 and 2016, respectively. However, despite the significance of industrial water security and the increase of industrial water demand, relatively little is studied regarding the industrial water use in Korea.

To plan, develop and manage water resources projects or new program related water policy, it is needed to estimate the exact value of industrial water using the information of water consumption and cost in the production process. This paper employs the marginal productivity approach in order to estimate the economic value of water in Korean manufacturing industry. We use a data set including detailed plant-level information in 2003 of more than 50,000 factories and consider Cobb-Douglas production function and Trans-log production function.

Valuing the Economic Benefits of the Water Quality Improvement in Pusan

So-Yoon Kwak
Ph.D. Student, Korea University, Republic of Korea
Seung-Hoon Yoo
Associate Professor, Hoseo University, Republic of Korea

Water is an indispensable input to human's existence and industrial production. In these days, people are getting more concerned about their health and the interest in the safety of drinking water has increased. In this situation, this paper attempts to measure the economic benefits of the tap water quality improvement. The study area was restricted to Pusan, the second largest city in Korea, where local government is planning to implement a tap water quality improvement program. We apply a one-and-one-half bounded dichotomous choice contingent valuation (CV) method to obtain at least a preliminary evaluation of the benefits. CV is developed for valuing goods or services that cannot be valued either directly or indirectly from market observations and has been applied to several environmental goods. The CV survey was rigorously designed to comply with the guidelines for best-practiced CV studies. We surveyed a randomly selected sample of 400 households in Pusan and asked respondents questions in person-to-person interviews about how they would be willing to pay for the water quality improvement. Respondents overall accepted the contingent market and were willing to contribute a significant amount (US$1.66), on average, per household per month. We can also calculate the aggregate value of the program which improves the water quality in Pusan. This study is expected to provide policy-makers with useful information for evaluating and planning environmental policies relating specifically to water.

Heat Flux and Hydrodynamics of the Membrane Wall in Supercritical Circulating Fluidized Bed Boiler

Wenkai Li
Ph.D. Student, Tsinghua University, China
Wu Yuxin
Professor, Tsinghua University, China
Yang Hairui
Professor, Tsinghua University, China
Zhang Hai
Professor, Tsinghua University, China
Yue Guangxi
Professor, Tsinghua University, China

Due to the high fuel price and restrict emission regulation, it is of great importance to efficiently and cleanly utilize the fossil fuels. Supercritical circulating fluidized bed (SCCFB) boiler with large capacity and high steam temperature is regarded as an advanced clean coal technology in high efficiency of power generation and low cost of NOx and CO2 control. This technology is under developing in China and worldwide. Steam hydrodynamics in the furnace is one of the most important aspects concerned in the boiler design. A complete hydrodynamic calculation method, coupled with a heat transfer model and a suspension solid concentration model are proposed for a SCCFB boiler. The method is applied to the hydrodynamic calculation of a conceptual designed 800MWe SCCFB boiler, at 100% Boiler Maximum Continuous Running (B-MCR), 40%, 60%, 78%, 90%, and 100% Turbine Maximum Continuous Running (T-MCR) load. A series of comparison under different operational conditions are concerned. The results showed that no Departure from Nucleate Boiling (DNB) takes place at any load. The maximum mid-fin tube temperature appears at B-MCR load, with a value of 499 □. Deviation of the fluid temperature which exists in the directions of furnace width and depth increases along the furnace height, as well as that of inner tube temperature, outside tube temperature and mid-fin tube temperature. The maximum temperature deviation at the tube outlet always occurs at 60% T-MCR load, which is within a classical sub-critical condition for sliding pressure operation. The largest heat flux appears near the furnace corner in the horizontal direction and at the furnace bottom in the vertical direction. Compared with the PC (pulverized-coal fired) boiler, the SCCFB boiler has safer heat flux distribution, with the maximum uneven ratio only 1.2 at the same height.

The PCDD/Fs Distribution in the Chloranil Products

Wenbin Liu
Associate Professor, Chinese Academy of Sciences, China
Ye Xing
Associate Professor, Chinese Academy of Sciences, China
Sumei Li
Associate Professor, Chinese Academy of Sciences, China
Minghui Zheng
Associate Professor, Chinese Academy of Sciences, China

Polychlorinated dibenzo-p-dioxins , dibenzofurans (PCDD/Fs) are among the persistent organic pollutants (POPs) targeted for international source reduction by the Stockholm Convention. PCDD/Fs are resistant to degradation and may remain for decades in the environment. p-Chloranil (2,3,5,6-tetrachloro-p-Benzoquinone) is used as an oxidizing agent in organic synthesis. Some substituted benzoquinones are used as reagents for the oxidation and dehydrogenation of hydroaromatic compounds. As chlorine is used as an important material and the production process maybe fulfill the reaction situation of PCDD/Fs, PCDD/Fs can be produced as impurities during the production of Chloranil. China is one of the nations with the highest production and consumption of Chloranil, thus it's significant to study the PCDD/Fs pollution in the Chloranil production. Some typical Chloranil plants were selected in this study and the PCDD/Fs in the Chloranil products were analyzed. The results are given in the Fig. 1. The PCDD/Fs congener profiles in these Chloranil samples were very similar, although the PCDD/Fs levels were obviously different.

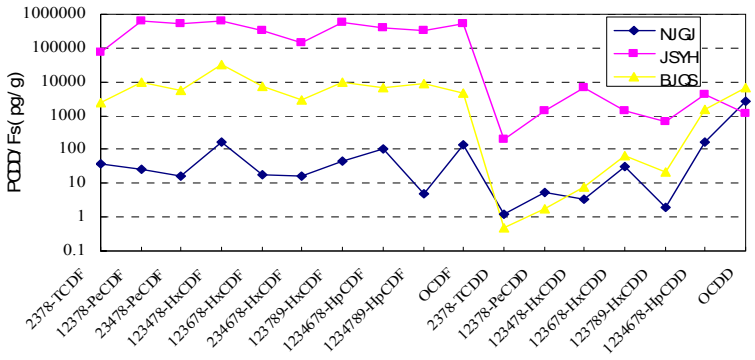

Fig. 1 The PCDD/Fs distribution in the Chloranil products

Sulfur and Nitrogen Accumulation in Leaves of Tree Species on Traffic Roadside of Beijing

Yanju Liu

Professor, Beijing Center for Physical and Chemical Analysis, China

High dose of NOx and SO2 are toxic to plants. SO2 accumulation in plant leaves was suggested as a useful measure of the air pollution level. Beijing is facing a high level of SO2 and NOx pollution, while the roadside trees have not been paid attentions to sulfur and nitrogen accumulation. This study assumed that Beijing roadside tree species could indicate local air quality by measuring leaf sulfur and nitrogen content. Leaves of eleven tree species were collected on Beijing roadside and analyzed, each with surface soil plant rooted. The results showed that leaf sulfur content is 2.21-10.95 mg/g (mean 4.41 mg/g), nitrogen 1.40-5.05 % (mean 2.37 %). Ginkgo biloba and Platanus acerifolia has highest sulfur content of 8.15 and 7.04 mg/g DW in leaves, separately, while Paulownia tomentosa and Juglans regia of 3.08 and 2.99%. Both leaf nitrogen and sulfur content are higher than or within the upper part of the normal values in plants. This well agrees with the high SO2 and NO2 level in Beijing. The irrelevance between leaf and soil nitrogen content might be a hint that leaf nitrogen was mainly fed by dry NOx deposition of air. Significantly negative correlation between Lg10[leaf S concentration] and Lg10[leaf Cd concentration] disagrees with previous test, where sulfur raise in solution increased leaf Cd content. This implies that leaf sulfur here probably resulted by air pollutants. Conclusively, ornamental plants on roadside of Beijing could be good indicators to sulfur dioxide and nitrogen oxide pollution in the air.

Organic Matter Removal in Two Vertical Subsurface Flow Pilot Plants

Mercedes Llorens
Professor, University of Murcia, Spain
Ana Belen Perez-Marin
Researcher, University of Murcia, Spain
Mª Isabel Aguilar
Assistant Professor, University of Murcia, Spain
Jose Saez
Professor, University of Murcia, Spain
Juan F. Ortuno
Assistant Professor, University of Murcia, Spain
Victor F. Meseguer
Assistant Professor, University of Murcia, Spain

The results obtained in pilot plant of a new natural technology for treating wastewater are presented in this paper. This technology, called symbiotic depuration®, combines a natural and subterranean treatment with the generation of green areas over the surface of the plant. It presents low costs of construction and maintenance due to the simplicity of its constructive elements and the low demand of energy. Symbiotic depuration could be considered to be based on the same technology as used in vertical subsurface flow wetlands the treatment of urban wastewaters coming from small villages is one of its possible applications. The whole depuration process consists of a number of stages in series that depends on the organic load of the wastewaters being treated. For urban wastewaters a pretreatment step is needed followed by a four-step procedure.

Two four-step pilot plants with different configurations have been constructed. The influent wastewater is pretreated before entering the pilot plants. The pretreatment consists of two subsequent rotary sieves with 0.5 and 0.25 mm sieve openings, respectively, a clarifier and a 130 μm mesh ring filter. The first plant treats 8 l/h of wastewater and consists of four columns (30 cm diameter) in series; the effluent of each column is filtered through another 130 mm mesh ring filter before entering the next column. The other configuration has a vertical distribution of the stages and thus, it is not necessary pumping and filtering the wastewater between the different phases of treatment; this plant treats 48 l/h and has a surface of 0.585 m2. Both systems were applied to the treatment of the wastewater produced in the Campus of Espinardo (University of Murcia, Spain). This paper shows a comparative study of the organic matter and suspended solids removal produced in these plants.

The effluent of both configurations complies with Directive 91/271/EEC requirements. The average removal efficiencies were 98.0% for TSS, 95.8% for COD and 98.8% for BOD in the four column plant and, 89.9% for TSS, 89.5% for COD

and 96.0% for BOD in the other pilot plant. In view of these results the two configurations of this technology may be considered suitable for the treatment of urban wastewaters.

The Study of Adhesive Properties of Bacterial Populations – A Starting Point for Biofilm Remediation Processes Development

Jan Masak
Professor, Institute of Chemical Technology in Prague, Czech Republic

Microbial biofilms have significant resistance to environmental stress factors (chemical toxicity, temperature, red-ox, pH, etc.). The transition from planktonic growth to biofilm change microbial phenotype which is often reflected in a wider range of utilized/degraded compounds. From this perspective, biofilm can be excellent biocatalysts in bioremediation processes. However, the key requirement is the time and mechanical stability of biofilms. Knowledge of adhesive properties of the microorganisms is necessary to obtain such biocatalysts. Rhodococcus erythropolis is able to efficiently degrade various aromatic compounds (e.g. phenol, catechol, benzoate, p-hydroxybenzoate and aniline). R. erythropolis recombinant strains showing a higher and stable level of phenol metabolic pathway enzymes (phenol hydroxylase, catechol dioxygenase) was constructed, as well. Chemical composition and physical properties of cell surface and extracellular polymeric substances (EPS) of the wild strain as well as the recombinant strains were analyzed. Contents of saturated and unsaturated fatty acids, mycolic acids and polysaccharides in cell envelopes were determined. All these compounds can significantly influence cell surface hydrophobicity, cell adhesion and biofilm maturation. Contact angle method and MATH method were used for assay cell surface hydrophobicity. Glass (hydrophilic) and silicon rubber (hydrophobic) were chosen as R. erythropolis biomass carriers. Adhesive properties of carriers were characterized by their hydrophobicity (contact angle method).

The overall change of free energy of microbial adhesion in different cultivation media was calculated. The received findings allowed preparation of stable biocatalysts. Laboratory reactor experiments showed a higher rate of biodegradation in biofilm systems compared with populations growing in suspension. Phenol degradation efficiency was investigated at the input phenol concentrations 0.3 g/l or 0.7 g/l. Biofilm catalysts better tolerated the higher pollutant concentration and reached nearly double degradation rate. Knowledge of factors affecting the cell adhesion may be essential for design of effective biofilm systems.

Estimation of Genotoxicity of Heavy Metals Salts with Application of Test-systems of Tradescantia (Clone 02)

Margarita Matevosyan
Senior Lecturer, Yerevan State University, Armenia

For the estimation of genotoxic effects of separate chemical matters, exactly of heavy metals (HM) it is reasonable to use plant test-systems. The most sensitive among them are: computation of Tradescantia flower stamen hair (Trad-SHM) and Tradescantia micronucleus (Trad-MCN) assay.

For the modeling of heavy metals mutagenic activity we have conducted an experiments with the application of Tradescantia flower stamen hair and micronucleus tests for the estimation of the mutagenicity of the following salts of heavy metals CrCl3, Pb(NO3)2, ZnSO4, NiCl2, CuCl2 and chrome oxide (CrO3).

Under the influence of solutions of following heavy metals salts CrCl3, Pb(NO3)2, ZnSO4, NiCl2, CuCl2 and chrome oxide with the application of Tradescantia stamen hair (Trad-SHM) mutation and the Tradescantia micronucleus (Trad-MCN) assays the frequency of the induction of somatic recessive mutation and micronucleus was identified. The ions of the same metal having different valence differ by their mutagenic activity. Thus hexivalent chrome raises the frequency of recessive mutations 1,5-fold in comparison with trivalent chrome. Besides the mentioned mutations with the elevation of the concentration of heavy metals salts there are also another types of deviations: stamen hair branching, development of dwarfish stamen hair, accretion of stamen hair, development of denuded stamen hair and anthers without pollen, the change of number of stamens, petals and sepals in flower. It is shown that the ions of investigated heavy metals are genotoxic. They induce somatic point mutations and cause clastogenic effects in sporogenous cells of Tradescantia microspores. Received results allow us to recommend Trad-SHM and Trad-MCN tests for the estimation of genetic danger of heavy metals.

Photocatalytic Production of Hydrgoen from Ethanol over Au-TiO2

Zarife Misirlioglu
Associate Professor, Ankara University, Turkey
Muammer Canel
Associate Professor, Ankara University, Turkey
Damla Sahin
Associate Professor, Ankara University, Turkey
Pinar A. Bozkurt
Associate Professor, Ankara University, Turkey
Hicham Idriss
University of Aberdeen, UK

Increasing population and urbanization worldwide increase the industry, technology and especially lack of energy. Fulfilling this need of energy, basic materials and the protection of environment are major problems that world has to face. Nevertheless, increase in lack of energy leads the researchers to investigate alternative energy resources such as hydrogen energy which is a clean resource. Hydrogen is pollution-free resource hence it doesn't contain any carbons. It is a carrier of because its combustion releases energy.

Hydrogen can be generated by steam reforming, partial oxidation, autothermal and dry reforming, water electrolysis, gasification and woody biomass conversion, biological hydrogen production, photo-dissociation, direct thermal or catalytic splitting of water. Beyond these ethanol is a suitable resource for producing hydrogen because in the whole process CO2 emission is near zero. One of the methods to produce hydrogen from ethanol is photocatalysis and this process is becoming more popular by researchers.

In this work production of hydrogen with photocatalytic method is studied. TiO2 anatase is used as a photocatalyst and Au is used as supportive noble metal to the semiconductor. 25 mg and 50 mg Au/TiO2 is reduced in a batch reactor at 400°C under H2 gas. After cooling, H2 is purged with N2. Different amounts of water and ethanol are added. Composed CO is purged with N2. After that batch reactor is put under UV irradiation (350 nm). The same process is repeated with different rates of water-ethanol mixture. The rates are 1:1, 2:1 and 4:1. In addition, the fraction from photocatalysis has been analyzed by using GC-TCD method.

The linearity between photons absorbed and amount of catalyst is investigated and it is found directly proportional. Changing catalyst concentration [0.25 – 0.5 g/L] does not affect the amount of photons absorbed. In addition the effect of different rates of ethanol/water mixtures in hydrogen production in the presence of Au/TiO2 is compared. It is found that in the rate of 2:1 is more effective. At low concentration water seems to enhance the rate of hydrogen production. The possible explanation could be that at low concentration water may replace surface of oxygen vacancies. Surface oxygen may have been used to oxidize CO to CO2.

Using Bran Rice Agriculture by Products to Remove Methylen Blue from Aqeous Solution

Ozra Hejri Mortaz

Head of Chemistry Department, Islamic Azad University, Lahijan Branch, Iran

The removal of the various pollutants such as heavy metals and pigments by adsorption technology by biomass (biosorption) are its effectiveness in reducing the concentration of heavy metal ions to very low levels and the use of inexpensive biosorbent materials. Using agriculture by – products to pollutants uptake is very important today.

In this study used bran rice to remove methylen blue dye corresponding to Longmuir model in batch system. It was seen that 83% of the initial dye (250mg/lit) is removed after 4 h at 25ºC and 2g/lit of bran rice.

The methylen blue dye can be as a cancer agent after using for the long time by human.

Elevated Risk for Skin Infections Associated with Floods in Taiwan

F.C. Sung
Professor, China Medical University, Taiwan
L.Y. Huang
Professor, China Medical University, Taiwan
Y.C. Wang
Professor, China Medical University, Taiwan
C.H. Chou
Professor, China Medical University, Taiwan
C.M. Liu
Professor, China Medical University, Taiwan

Design of a Workflow-based IT-Assistant System for CO2 Emission Trading

Bernd Page
Professor, University of Hamburg, Germany
Ph. Joschko
Professor, University of Hamburg, Germany
Christian Schmitz
Professor, University of Hamburg, Germany

The hot political discussion is driven by the idea of lowering the greenhouse gas emissions as well as of the urge to become more independent of fossil energy sources. In this scenario emission trading is one of the key issues. Emission trading as a market-based instrument should help the EU to accomplish the objectives being settled in the Kyoto Protocol. In the European emission trading system companies in the energy sector and other sectors with high emissions, who emit more CO2 than allowed by trading laws, have to buy missing allowances. Emission allowances can be bought by high emitters from other facility operators with a surplus of allowances, through a broker or on the stock exchange. By defining upper emission limits and by trading emission allowances (Cap and Trade) the market will automatically look for the most efficient and affordable emission reductions.

In this work the CO2 emission-trading system will be analysed from the point of view of applied computer science. Moreover, the duties and working processes of the different actors like the facility operators will be identified. Further alternative IT-approaches are examined to find the most suitable solutions to support the facility operators in their duties. As a result we demonstrate that especially software assistants are highly suitable. They are able to take the facility operators by the hand and guide them step-by-step trough the jungle of the emission trading system. They support facility operators with single duties - like the data preprocessing, the allocation process, the emission reporting and the trading of emission allowances – as well as guide through the complete trading process.

Based on the software assistant concept a draft of an assistant system for supporting the facility operators will be introduced and its increments will be discussed. The central workflows for the different duties of the facility operators have been analysed to set up this draft.

Our approach of an easy to use and step-by-step guiding software assistant is very appropriate and promising to ease the duties of the facility operators in the complex process of emission trading.

Asian Dust Aerosol Budgets over the Asian Region in 2009 Estimated by ADAM2

Soon-Ung Park

Professor & Director, Center for Atmospheric and Environmental Modeling, Republic of Korea

The Asian Dust Aerosol Model 2 (ADAM2) with the MM5 meteorological model has been employed to estimate dust emission in the dust source region, dust concentration, and wet and dry depositions of dust in the Asian region (70-150oE and 10-60oN) for the year of 2009. It is found that the model simulates quite reasonably the dust (PM10) concentrations in the dust source region and the downstream region of Korea where several dust monitoring sites are available. Comparisons between monitored and model simulated dust concentrations both in the dust source region and the downstream region show that the starting and ending times of most of dust events and their peak concentration occurring times are well simulated. The annual average dust (PM10) concentration near the surface is found to be 180 over the dust-source area in central northern China, 40 over the Yellow Sea, 28 over the Korean peninsula and 20 over the East Sea. It is also found that the annual total deposition of dust is about 120 (dry deposition, 105 ; wet deposition, 15) in the dust source region, 20 (dry deposition, 8 ; wet deposition, 12) in the Yellow Sea, 13 (dry deposition, 7 ; wet deposition, 6) in the Korean peninsula and 11 (dry deposition, 2 ; wet deposition 9) in the East Sea. Their ratios of wet deposition to total deposition of dust in the respective regions are 13 %, 60 %, 46 % and 82 %. This clearly indicates that the main dust removal mechanism from the atmosphere is dry deposition over the source region whereas wet deposition predominates in the downstream region of the sea. The presently estimated dust deposition could adversely impact the eco-environmental system in the downstream regions of the dust source region significantly. We will also present Asian dust aerosol budgets over the Tibetan Plateau and the northwestern Pacific Ocean.

Sea Water Heat Recovery for the University of British Columbia's District Heating System

E. Patsa
Ph.D. Researcher, University of British Columbia, Canada
B. Moosavi zadeh
MSc Student, University of British Columbia, Canada
J. Meech
Professor, University of British Columbia, Canada

Capture Carbon Sequestration (Ccs): Technologies to Capture and Storage

Fernando Luiz Pellegrini Pessoa
Professor, Federal University of Rio de Janeiro, Brazil
Claudia Ferreira da Silva
Teacher of Mechanical Technical Course & Ph.D. Student, Federal Institute of Rio de Janeiro, Brazil

The natural carbon cycle plays an essential part in the greenhouse effect, phenomenon responsible for planets's average temperature that consists in a thin layer of gas surrounds the Earth planet, holding in a portion of solar radiation. The Carbon, fourteenth most abundant component of the planet, it can be found in a variety of substances: CO2 ou CH4 (atmosphere); stored in organic matter; or in rocks as carbonates. During the respiration process ou decomposition of organic matther, the CO2 is released while O2 is absorbed. On the other hand, organisms as plants, bacterias and mikro-plankton absorb the CO2 and give off O2; what allows a ballanced carbon budget. But since the "industrial era" this natural cicle have been disturbed by human activities, in special that associated to the great emissions of CO2 to atmosphere due to combustion. The emissions and concentrations of Greenhouse gases at the Atmosphere have been impacting the environment because promote climate changes. Climate changes ask for man and environment adaptation related to food; water resources; ecosystems; biodiversity and health.

In the presence of this great problem humanity needs to meet solutions to the growing demand to energy. The level of this problem requires 2 strategical behaviors: adaptation and mitigation. This last one consists to decrease the emissions of gases of greenhouse, which can be made by the use of clean technologies to energy generation, as renewable sources. Althought the replacement of technologies isn't a trivial matter to solve, because it implies in economy and politics wishes. Because of that, during this transition period it is necessary to apply different mechanisms to minimizing the CO2 in atmosphere. This work intends to show a scenery of technology to CO2 Capture and Storage, talking about different techniques since the capture, transportation untill storage.

Analyzing the Qualitative Characteristics of Compost and Bio-compost in Zahedan, Iran

Issa Piri
Assistant Professor, University of Payam Noor, Iran
Iman Homayoon Nezhad
University of Payam Noor, Iran
Paria Amirian
University of Payam Noor, Iran

Nowadays dealing with quality and quantity of urban solid wastes and recycling and separating materials as well as reusing organic wastes materials in order to generating compost and biocompost are the most important issues in urban solid wastes management all around the world. With this in mind, quality enhancement of compost and biocompost produced from urban solid wastes is of major concern. In the context of a research project, physicochemical characteristics of compost and biocompost of Zahedan city are analyzed. Compost and biocompost produced in summer and winter of 1385 are collected and utilized as samples. As the outcomes of this research illustrated, concentration of heavy metals such as cadmium, cupper and zinc are not in proper levels and humidity percent of fertilizers are below the normal limit due to evaporation and high temperature of summer season. In contrast, concentration of nutrients such as nitrogen, phosphor and potassium are normal. In general, keeping compost and biocompost in desired quality requires more protection especially in high temperature seasons.

Geostatistical Investigation of Forest Soil Contamination from Mining and Smelting Activities in Goslar District (Middle Germany)

Ragab Rabeiy
M. Sc. Clausthal University of Technology, Germany
Wolfgang Busch
Univ.-Prof. Dr.-Ing. Clausthal University of Technology, Germany
Steffen Knospe
Dr. Rer. Nat. Clausthal University of Technology, Germany
Walter Schmotz
Dr., Department of Building & Environment, District Administration, Germany

Goslar district in the middle of Germany was one of the most important mining and metal production areas in the world for the last 1000 years. The long history of mining, mineral processing and smelting activities has enriched the forest soil in that area with many heavy metals. Spatial distribution and hazard assessment of soil heavy metals Pb, Zn, As, Hg, Cd, Sb and Cu were investigated using geostatistics and geographical information system (GIS) techniques. Geostatistical-Analyst extension of ArcGIS was applied to explore the data, transform to normality, calculate the experimental variogram and fit a suitable model for each polluted element. Ordinary Kriging was applied to map the spatial patterns of soil heavy metal contamination and Indicator Kriging was used to quantify the probability of heavy metal concentrations exceeding their threshold values. A GIS model and the kriging prediction error were used to select 50 new soil sample-locations to optimize the spatial distribution of samples and to improve reliability of interpolation results. The paper presents a method to combine different hot spot locations with different geostatistical structures on a general prediction map. The method allows different variogram models and search-neighborhoods for each high grade polluted area and merges them with the global predicted map. This technique improves the quality of spatial prediction of soil heavy metals and derived hazard maps.

The Degradation of Oligonucleotide based Pharmaceutical Products by Selected Chemical Means

Carol Robinson
Ph.D. Student, University of Limerick, Ireland
Gary Walsh
Professor, University of Limerick, Ireland
Tom O' Dwyer
Professor, University of Limerick, Ireland

Antisense technology is a nucleic acid-based approach capable of down regulating the expression of specific disease-related genes which offers the potential to generate cutting edge biopharmaceuticals. Their unique manufacturing routes and bioactivity raises hitherto, unaddressed environmental issues. With the inevitable development of antisense technology and the increasing number of products entering various stages of clinical trials, the manufacture and use of antisense oligos at industrial scale could result in its unintentional release to waste streams and hence into the environment. This project seeks to develop technical methodologies and effective treatment processes to degrade/remove antisense drugs from manufacturing waste streams in order to prevent the accidental release of active antisense product into the environment.

Phosphorothioate oligos (PS oligos), in which one of the non-bridging oxygens of the internucleotide phosphodiester linkage is replaced by a sulphur atom, are the most commonly employed antisense oligos in clinical trials to date. Therefore, they are the focus of this study. Unlike their unmodified counterparts, modified PS oligos, by design, display increased chemical and nuclease stability and hence would likely persist for longer in the environment if released. Chemical methodologies (acidic pHs and oxidising agents) of degrading PS oligos were chosen and systemically analysed both qualitatively and quantitatively using Polyacrylamide Gel Electrophoresis (PAGE) and Ion-Pair Reversed-Phase chromatography (IP-RP LC). Most significant degradation was observed following treatment with low acidic pH, (1M HCl) at 40 °C giving rise to 87 % degradation. Treatment with oxidants, K2Cr2O7 (0.125 M K2Cr2O7 in 0.025 M H2SO4), I2 (25 mM), HNO3 (15 %) and KMnO4 (50 mM) effectively degrading the modified oligo by 95, 93, 82 and 80 %, respectively, within 60 minutes of treatment. These methodologies may potentially be used to treat PS oligo containing waste steams, rendering them free of active drug product.

Traffic and its Effects on Tehran's Air Pollution

Ebrahim Safa
Assistant Professor, Azad University South Tehran Branch, Iran
Arman Safa
MSc Candidate, Azad University South Tehran Branch, Iran

Pollution is when, there is an extra substance in the air, or when change is in its structure.according to the scientific research, the increase of pollution causes change and its orders .Tehran the capital of Islamic republic of Iran, is one of the biggest cities in the world with the heaviest traffic that caused a heavy pollution .there are several environmental problems.one of the environmental problems of this city is heavy traffic, although there is a heavy traffic, production of vehicles are high too, and now new construction for new highways and new roads had been made the existing routes are not enough to solve the problems .Life is made difficult due to these problems.

The over loading of vehicles that, enter the capital and trading city from the some urban cities caused where high pollution problems.

This article has been written to show the effect of vehicles on the air pollution and its rates.

Mechanisms and Kinetics of the Wet Air Oxidation of Phenol by Homogeneous and Heterogeneous Transition-metal Catalysts (CWAO)

Concetta Saja
Ph.D. Student, Univeristy of Messina, Italy

Use of Solar Energy for Water Heating in New Popular Housing Projects in Brazil

Paulo Roberto dos Santos
Professor, Campinas Anhanguera, Brazil
Daul Ruiz Dias Neto
UNICAMP – State University of Campinas, Brazil
Elisa de Podesta Gomes
UNICAMP – State University of Campinas, Brazil

Today, Brazil has close to 180 million people living in something close to 50 million households. It also has a housing deficit of about 7 million homes and a housing program is premised on the construction of 1 million homes, and they can use solar panels for water heating in place of electric shower, so common in Brazil. This study aims to evaluate the use of solar energy for heating water for bathing will be deployed in new housing programs popular in Brazil, as the conservation of energy. Thus, we evaluated the technical and economic feasibility for the implementation of these heaters and their impact on electricity demand. In studies, the period of depreciation of the solar heating and reduce the monthly cost of electricity was estimated at pre-established parameters for the area of location of residence, excluding the states of North and Northeast due to the low representation that the electric shower has the power consumption of these regions. Another important factor was found to reduce demand at peak times, representing a significant savings of electricity for the country. Public policies of government are essential to ensure the country's progress towards energy efficiency and sustainability.

Cleaner Production Implementation Process Focused on an Integral Water Management: The Case of Tanneries in Villapinzon and Choconta

Tania Fernanda Santos
Researcher, Universidad Nacional de Colombia, Colombia
Carolina Tobon Ramirez
Researcher, Universidad Nacional de Colombia, Colombia

Cleaner production (CP) has been settled as an integral approach for identifying, reducing and controlling negative effects resulting from highly polluting production activities. This paper shows the results of CP implementation in twelve microtanneries located at Villapinzon and Choconta. Research and implementation itself were conducted by Instituto de Estudios Ambientales (IDEA) under the framework of SWITCH (Sustainable Water Management Improves tomorrow Cities Health) project. Methodology involved a two-phase study. At the research phase, a three-component analysis was made, applying the Environmental Impact Evaluation (EIE) procedure (Conesa,2003), with the aim of integrating and weighing on a single scale the factors that could be modified trough CP implementation. This initial work concluded that most influential actions on chosen environmental factors are: association capability, tanning waste water recycling, eco-dehairing, and interinstitutional management. These results can be adapted for their application in other tanneries at Colombia or worldwide (Santos et al, 2007). At the application phase, environmental and production diagnosis were made for each tannery, and, in so doing, field-recorded data were arranged as indexes, showing great variation between factories. Also, drastic modifications were implemented in three operations of the production process. For each tannery, a separate evaluation was conducted, on the grade of compliance with recommended measures affecting four CP components. Finally, conclusions and recommendations are made regarding CP implementation at these tanneries and the need for articulating this strategy with environmental regulation and interinstitutional management, inside an approach of integrated water resource management (WRM).

Investigations on the Structure-chemistry and Chemodynamics of Covalently Immobilised Nonylphenol Residues in Soil Derived Organo-clay Complexes

Jan Schwarzbauer
Professor, RWTH Aachen University, Germany
Patrick Riefer
Professor, RWTH Aachen University, Germany
Timm Klausmeyer
Professor, RWTH Aachen University, Germany
Andreas Schaffer
Professor, RWTH Aachen University, Germany
Burkhard Schmidt
Professor, RWTH Aachen University, Germany

Organo-clay complexes in soil play a major role in immobilisation and the persistence of xenobitotics and their metabolites. This study contributes to the understanding of the interactions in such complexes. The biogeochemical and chemodynamic behaviour of 13C- and 14C-labelled 4(3', 5'-dimethyl-3'-heptyl)phenol (NP) during the formation, release and degradation of residues covalently bound to natural humics-coated clay has been investigated. This compound is the most important isomer of the nonylphenols, which are well known endocrine disrupters.

Adsorption and binding of the xenobiotics to organo-clay complexes derived from an A-soil (sand: 74%, silt: 17%, clay: 5%, C-org.: 8.2%) have been investigated by separating humics-coated clay into fulvic acids, humic acids and humin. In detail 14C- and 13C-labelled NP were applied on the soil with incubation periods up to 180 days. At different time points (1, 7, 14, 30, 90 and 180 days), soil samples were collected and divided into sand, silt and clay. Further on, the clay-fraction was separated into fulvic acids (FA), humic acids (HA) and humin. Supplementary, the mineralisation of NP to 14CO2 was determined. Additionally, the complete soil and the aqueous fraction occurring during sample preparation were analysed for their microbial activity (reductase) and carbon content (TOC). Samples derived from the 14C assays were used to determine the 14C distribution among several fractions and were analysed by DC and HPLC. For GC-MS and NMR spectroscopy, corresponding 13C samples were prepared in order to obtain structural information of the residues. The combined application of the 14C and 13C methods allowed tosupport information on the structure and binding of the covalently immobilised residues.

Briefly, most of the radioactivity was partitioned into the silt and clay fractions. During particle size separation solely 6-11 % of radioactivity was found in the water soluble organic matter. At sampling day one 34 % of the initial radioactivity was extractable by organic solvents and not incorporated into the clay organic matter. In the further course the non-extractable fraction increased, in which nearly 25 % of the

applied radioactivity was located on clay humic substances. Up to day 180 the radioactivity in humic acid and fulvic acid fractions increased whereas the percentage in the extractable fraction decreased.

With respect to the 13C-assays a sequential application of chemical degradation techniques like alkaline hydrolysis and BBr3-assisted ether cleavage allowed an allocation of covalently bound residues, within the different humic fractions.

Use of Waste Materials for the Removal of Silver- A Comparison of Adsorption and Kinetic Studies

Gaye Inanc Senel
Research Assistant, Ondokuz Mayis University, Turkey

Industrial wastewater is often characterized by considerable heavy metal content and, therefore, treatment is required prior to disposal in order to avoid water pollution. The presence of the above metals in the environment is of major concern of their toxicity accumulate in living organisms and threat for human life and for the environment, especially when tolerance levels are exceeded.

One of the most important heavy metal is silver. Silver is generally found in the combined state in nature, usually in copper or lead mineralization. The major industrial use of silver is as silver halide in the manufacture of photographic film. In 1983, approximately 44% of silver was used in the manufacturing of chemicals for photographic products in the USA. Other industrial uses of silver include the production of electrical contacts and switching gear, batteries catalysts and mirrors. The main technologies used for silver removal wastewaters include precipitation, ion exchange, reverse osmosis, solvent extraction, cementation, electrocoagulation, coagulation-flocculation, adsorption, reductive exchange and electrolytic recovery. Adsorption has attracted attention because of new material types available for the recovery process. Cost-effective materials that have been investigated for their potential use as adsorbents for heavy metal uptake include sawdust, banana and orange peels, fly ash, red mud, tea industry waste, bagasse fly ash, phosphogypsum, bentonite, waste materials as refuse concrete, zeolite and others.

The aim of the present study is to investigate the removal of silver ions from aqueous solutions using fly ash, phosphogypsum and red mud. The optimum conditions for adsorption/ion exchange by using a batch method were evaluated by changing various parameters such as particle size, contact time, initial pH of the solution, adsorbent amount, initial metal concentration and acidic treatment. The Langmuir, Freundlich and Temkin adsorption isotherm equations were derived form the basic empirical equations, and used for calculation of adsorption parameters.

Soil Degradation: Prompt Resurrection
(Outset of Creation: Birth of Soil; End of Creation: Death of Soil)

Adel Sepehr
Academic Staff, University of Isfahan, Iran

According to the religious beliefs, human arises from soil and come back to his origin. The role of the soil is of vital importance to mankind and the maintenance of a healthy natural environment. The soil is a natural resource, which is not renewable in the short term and very expensive either to reclaim or to improve once it is eroded by water or wind, physically degraded or chemically depleted. Over the past three decades, there has been an increased awareness of the impact of growing human populations and the consequent pressures on environment and this has led to a number of important initiatives such as the Montreal Protocol on Substances that Deplete Ozone, the United Nations Conference on Environment and Development (UNCED) Plan of Action (Agenda 21) and the three Conventions arising from UNCED, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD). Of the various anthropogenic actions that these initiatives address, land/soil degradation is perhaps the most visible as it affects more human lives than other anthropogenic actions. In this paper, has been introduced soil degradation as main parameter to ruin earth and discussed influences of human activities in its process in the recent decades. Ultimately, it has been tried to invest factors on combating soil degradation.

Effect of Different Soil Moisture Regimes on Nitrogen and Carbon Cycles in Arable and Grassland Soils

A. Shah
Researcher, Hohenheim University, Germany
M. Lamers
Scientific Assistant, Hohenheim University, Germany
T. Streck
Professor, Hohenheim University, Germany

Greenhouse gas emissions have been increased during the last century due to anthropogenic activities such as agricultural practices, fossil fuel burning and industrial activities. However, the formation of greenhouse gases, such as N_2O or CO_2 in arable soil is strongly controlled by both soil temperature and soil moisture. In this study the response of CO_2 and N_2O fluxes from soil towards drying-rewetting events has been investigated by means of a microcosm experiment with two different soils, one grassland and one cropland soil. Sampling was done at the research station Heidfeldhof located close to the Hohenheim University. In total four treatments were conducted: a control treatment (T1) with continuously moist conditions at pF 1.8, a treatment (T2) with short drying cycles, a treatment (T3) receiving medium drying cycles and a treatment (T4) with long drying cycles. The treatments T1, T2, T3 and T4 received 0, 6, 4 and 2 drying cycles, respectively. Gas samples were taken manually about daily with 100 cm^3 pre-evacuated vials and analyzed by gas chromatograph. Soil samples were analyzed for NH_4 and NO_3 at the end of the pre-incubation phase, just prior the drying cycle, immediately after rewetting and at the end of the rewetting phase. For the grassland soil the treatment receiving short drying cycles (T2) yielded the highest cumulative N_2O fluxes (12, 14± 3, 49 sdv). The arable soil, however, behaved differently, the treatment having continues moist conditions showed the highest N_2O fluxes (18, 93 ± 7, 05). For CO_2 emission both soils showed similar emission pattern, at which the treatment receiving short drying cycles yielded highest cumulative fluxes (grassland 11202,29 µg ± 7214,72 sdv, arable land 11892,43 µg ± 3839,61 sdv).In our presentation we will focus on measurement results with regard to N_2O and CO_2 fluxes affected by several drying-rewetting cycles.

Eco-Toxicity of Arsenic and Antimony

Irina Shtangeeva
Professor, St. Petersburg University, Russia

Arsenic (As) and antimony (Sb) are metalloids that belong to Group 15 of the Periodic Table. Chemically they are rather similar. Therefore, we could also expect similar environmental behaviour of these two elements. However, recent experimental studies showed that uptake of As and Sb by plants may be different. Both elements are well-known toxicants, but so far more investigations have been carried out on eco-toxicity of As compared to the research on toxic effects of Sb. Up to now, it was commonly accepted that Sb is less toxic than As.

In our research, we performed a series of experiments on effects of different doses of various compounds of As and Sb on several plant species. The experiments were conducted both in soil and hydroponically. Elemental analysis was performed by ICP-MS. In addition to As and Sb we also determined concentrations of 30 more macro- and trace elements in different plant parts and in soil and water where the plants were grown.

It was found that growth of young seedlings was significantly suppressed when concentrations of toxicants in the growth media exceed level of 70 mg kg-1. Different plant species demonstrated different reactions on the increase of As and/or Sb concentrations. The least effects were registered for wheat; while for rye and oats we observed clear signs of leaf necrosis as a result of bioaccumulation of Sb and As. The length of roots that were in direct contact with medium enriched with these metalloids was significantly decreased compared to root length of the control plants. Different plants could uptake different species of As and Sb (for instance, Sb+5 and Sb+3) rather differently. Bioaccumulation of Sb and As led to significant variations in concentrations of many essential nutrients in different parts of the plants. Sb is probably even more toxic than As.

Recycling of Waste Plastics into Chemicals Species

Mohammad Nahid Siddiqui
Assistant Professor, King Fahd University of Petroleum & Minerals, Saudi Arabia

Plastic waste creates serious environmental challenge because of their huge quantity and disposal problem as thermoplastics do not biodegrade over a longer period. The land filling of sites and incineration of waste plastics have serious drawbacks. Saudi Arabia is one of the major producers of plastic in the world with total production capacity of around six million tons per year. The amount of plastic wastes in Saudi Arabia is about 15-wt% in the composition of domestic municipality waste. It has been estimated that almost 170 million tones of plastics were produced worldwide including approximately 15 million tons in Europe and 14 million tons in United States. Recycling of plastic wastes has become a major response to the environmental challenges facing the plastic industry. Recycling has several meanings. Primary recycling is the processing of scrap plastics into similar types of products. Secondary recycling separates and readily reprocess into granules by melt extrusion. Tertiary recycling involves the transformation of polymeric materials into a variety of products ranging from the starting monomers, to oligomers or mixtures of other hydrocarbon compounds. Quaternary recycling is an effective way to reduce the volume of organic materials by recovering the latent energy content of plastic materials by incineration.

We have carried out tertiary and chemical recycling of plastics in our laboratory. Pyrolysis reactions were performed on individual (LDPE, HDPE, PP, PS, PET and PVC) plastics, mixed plastics and co-liquefaction processes using optimum conditions under nitrogen and hydrogen pressures. In case of PVC, first dechlorination was carried out followed by liquefaction process. The product obtained from tertiary and chemical recycling processes shows that these processes can be used for converting hazardous waste plastics into important chemical products.

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Underground Gas Storages and their Stabilising Function in Gas Sector

Jakub Siemek
Professor, AGH University of Science & Technology, Poland
Stanislaw Nagy
Vice-Dean of Drilling & Oil-Gas Faculty, Chair and Professor of Natural Gas Department, AGH University of Science & Technology, Poland

Underground gas storages are an important element stabilizing and limiting the risk in gas economics and market, including market (prices and magnitude of deliveries), risk of regulation of gas market and political risk (renegotiations of contracts, transit). The definition of energy safety, including safety of regional delivery, e.g. Europe-34 in gas was a subject of numerous discussions and methodology analyses (eg. the unstable gas deliveries, and the correlated stability of prices, result from the existing risk of gas sources, transit, transfer and gaseous systems responsible for gas delivery). The types of risk can be classified as follows:

Short-term delivery, as opposed to the long-term delivery and transfer infrastructure supplying gas to the consumer's markets,

Operational risk related with everyday operational safety of gas market (situations resulting from, e.g. seasonal or extreme weather conditions) as opposed to the strategic safety (catastrophic situations, great political instability, breaks in gas delivery).

In Europe, the storing capacities may cover as much as 30% of annual demand. This would be a significant aspect of energy safety as far as imported gas delivery and public safety are concerned. UGS becomes a market instrument facilitating fluent gas trade (swap, spot). A full analysis of role of Underground Gas Storages in the whole gas economy is described. Present status and trends related to new EU economy policy is presented.

Managing Waste through the Product Life-cycle

Pia Tanskanen
Senior Environmental Manager, Nokia Corporation, Finland

Recycling is one of the focus areas of Nokia's environmental work. Waste is managed through the product lifecycle from suppliers and own manufacturing and office sites to the consumers disposing of obsolete products in their end of life. Processes for managing waste differ through the lifecycle as they are more difficult to control outside of the company and the time span when the waste is born varies from hours in production up to 10 years in the consumer side. As the time before the product becomes a waste is much longer in the consumer collection (product end of life) compared to the manufacturing waste, it is more difficult to predict the waste amounts and locations. Waste is more dispersed and this creates new challenges such as raising the consumer awarness and arranging the logistics in order to get products collected and recycled.

This paper presents three case studies how waste is being managed in different parts of the product life cycle from the manufacturing to consumer waste collection. At production sites the management of waste is everyday business practise where small improvements can still be made. In the example from Brazil the waste of the packaging material is minimized to zero and a closed loop recycling case can be presented. The case is a good example of the cooperation of multiple stakeholders to get to the environmentally, and economically optimized solution. At consumer site the awareness raising is the big part of the electronics waste treatment as the practices are not yet seen as everyday's business. Two examples of consumer recycling campaigns from India and Finland are presented. Many similarities can be seen in the results as consumers are appreciating the information on how and where to recycle their old electronics.

Modeling Chronic Volcano Hazards and Community Resilience around Mount Tungurahua, Ecuador

Graham Tobin
Professor, University of South Florida, USA
Linda Whiteford
Professor, University of South Florida, USA
Carmen Laspina
Nacional de Promoción de la Salud, Ministerio de la Salud Publica, Ecuador

Chronic natural disasters can have long-term often debilitating impacts on society. Ameliorating such impacts, and hence reducing human vulnerability, are various social, economic and political characteristics, such as personal relationships, social contacts, shared interest groups, and other community-building activities. In addition, individual attitudes towards disasters also affect community resilience. This research used a simple multi-dimensional, integrated model of relationships among different outcome measures, as measured through individuals' attitudes and their utilization of social support, in a chronic natural hazard context. Research was undertaken in several communities located in the shadow of Mount Tungurahua, Ecuador, an active volcano that has been depositing ash over the surrounding landscape for over ten years. Field work strategies included structured questionnaires and in-depth ethnographic studies of local residents, interviews with government officials and political leaders, and collection of epidemiological data. Results demonstrated that residents have faced considerable hardships since 1999, especially those living at high elevations in heavy ash fall areas, culminating in lost agricultural opportunities and compromised health. Levels of recovery following the initial eruptions have been variable, and for those evacuated even more problematic. Data indicate that individual attitudes towards chronic hazards, in part measured by perception of risk, result in different health outcomes, and that different levels of social support significantly impact the socio-economic conditions of populations exposed to the ongoing disaster. From these findings, a model of Chronic Exposure and Hazards has been developed which has the potential to assist emergency medical personnel, policy makers, and civil defense planners.

Degradation of Hexachlorobenzene Using Self-assembled Flower-like α-Fe2O3/Fe3O4 Micro/nano Material

Guijin Su
Associate Professor, Chinese Academy of Sciences, China
Manke Jia
Associate Professor, Chinese Academy of Sciences, China
Minghui Zheng
Associate Professor, Chinese Academy of Sciences, China

Disposal of persistent organic pollutants (POPs) has become a major environmental and social problem, because most of them are toxic and thermally stable, accumulating in the surroundings for long time periods. Thus, a series of technology for detoxifying organic chlorines have been developed, including incineration, biodegradation, physical treatment and chemical degradation. Until now, the most efficient way to destroy POPs is by incineration. However, it often leads to the release of even more toxic compounds such as chlorinated dioxins and furans. The development of a highly efficient, safe alternative technology for detoxifying POPs has been anticipated with the chemical degradation. Recently, catalytic degradation using the metal oxide, in particular in combination with nanotechnology, has attracted much attention.

In the present study, novel self-assembled, three dimensional (3D) hierarchical, flower-like micro/nano iron oxide materials were developed to degrade hexachlorobenzene (HCB), as a model compound of POPs. It was found that HCB was rather quickly degraded by as-prepared hierarchical flowerlike α-Fe2O3/Fe3O4 composite at low temperature of 300°C. The superior performance was attributed to the unique structures of the synthesized materials. The time-dependent degradation behavior of HCB exhibited pseudo first-order kinetics. Lower chlorinated benzenes were identified as the main products. The predominant HCB hydrodechlorination pathway was found to be HCB → PeCB → 1,2,3,4-TeCB, 1,2,3,5-TeCB → 1,2,4-TrCB → 1,2-DCB → MCB. The α-Fe2O3/Fe3O4 composite retained the 3D hierarchical flower-like micro/nano morphology after HCB degradation, and the original phase composition was easily regenerated by calcination.

Effects of Hurricane Katrina on Land Cover within the Grand Bay National Estuarine Research Reserve in Mississippi, USA

Paul B. Tchnouwou
Associate Dean & Presidential Distinguished Professor, Jackson State University, USA
Eric D. Evans
Jackson State University, USA
Yerramilli Anjaneyulu
Jackson State University, USA

Hurricane Katrina hit the Mississippi Gulf Coast on August 29, 2005 as a Category 3 hurricane at the mouth of the Pearl River, on the Mississippi/Louisiana border. Katrina is considered one of the costliest natural disasters in United States history. Grand Bay National Wildlife Refuge (GBNWR) is located in the coastal zone of Jackson County in Mississippi, and Mobile County in Alabama. The Mississippi portion of GBNWR is part of the 18,400-acre Grand Bay National Estuarine Research Reserve (NERR), which was designated in 1999. The objectives of this study were to map changes to wetland and forest habitats resulting from hurricane Katrina and to discuss the implications of changes in these habitats on biodiversity within the Grand Bay NERR. Pre- and post-Katrina subsets of the Grand Bay NERR, Bayou Heron, and Bangs Lake were derived from Landsat images downloaded from The Coastal Change Analysis Program's (C-CAP) website. Unsupervised classification and change detection analysis were applied to each Landsat-derived, 3-band datasets. The land cover change analysis revealed that hurricane Katrina caused a decrease in evergreen forest, and the conversion of evergreen forest into grassland. The major land cover changes were due to the expansion of open water. The increase in open water caused the decrease in estuarine emergent wetlands (salt marsh habitats) and the conversion of one type of land cover into another. These land cover changes could have a profound effect on the flora and fauna located within the reserve. Remote sensing technology appears to be a valuable tool for monitoring and implementing restoration and conservation strategies by the Grand Bay NERR managers.

Groundwater Pollution Monitoring in Urmia Plain

Ruhollah Taghizadeh Mehrjardi
Ph.D. Student, University of Tehran, Iran

Groundwater quality mapping over extensive areas is the first step in water resources planning. In mapping Groundwater quality, two main stages can be distinguished: 1) the sampling stage, during which measurements are taken of the environmental variable at selected locations; and 2) the prediction stage, during which the observations are interpolated to a fine grid. The quality of the resulting map is determined by both stages. Geostatisticians and pedometricians have concentrated most on the second stage, by applying various types of interpolation methods. The present study was therefore, carried out with objectives to evaluate accuracy of different interpolation methods, kriging, cokriging and IDW, for prediction of some Groundwater quality (TH, EC and SAR) parameters in Urmia region. After normalization of data, variograme was computed. Suitable model for fitness on experimental variograme was selected based on less RSS value. Then the best method for interpolation was selected, using cross-validation, ME and RMSE. Results showed that for SAR co-kriging performed better than other methods and for the rest of GWQI included TH and EC IDW technique had better result than geostatistical method to simulate groundwater quality indices. Finally, using geostatistical and IDW methods, map of Groundwater were prepared in GIS environment.

Antioxidant Enzyme Activities and Lipid Peroxidation in Tissues of Hake (Merluccius merlucius L.) and Sea Bream (Pagellus erythrinus L.) from the Adriatic Sea

Ivana S. Trbojevic
Ph.D. Student, University of Kragujevac, Serbia
Branka I. Ognjanovic
Assistant Professor, University of Kragujevac, Serbia
Natasa Z. Dordevic
University of Kragujevac, Serbia
Andras S. Stajn
University of Kragujevac, Serbia
Zorica S. Saicic
University of Belgrade, Serbia

The development of anthropogenic activities is the main factor leading to the increasing levels of contaminants in the marine environment. Fish are the most important organisms used in biomonitoring of aquatic ecosystems. The fish uptake of pollutants and the major routes of input will depend on the particular dietary and ecological lifestyles of the organisms. Many xenobiotics may cause oxidative stress leading to alterations in the antioxidant defense system (AOS) in aquatic organisms. Activity of the enzymes of the AOS in fish tissues represent significant biomarkers in the assessment of the status of environment.

Specimens of two marine fishes with a different ecological lifestyles, hake (Merluccius merluccius L.) and sea bream (Pagellus erythrinus L.) were collected May 2005 from the locality in front of sea-port Bar (South Adriatic Sea). Oxidative stress biomarkers: the activity of AOS enzymes (superoxide dismutase – SOD and catalase – CAT), concentrations of lipid peroxidation – LPO and reduced glutathione (GSH) were determined in the liver and white muscle of hake and sea bream. Physical-chemical parameters, as well as the concentrations of nitrites, nitrates and detergents in the water of investigated locality were determined.

Obtained results showed that activities of SOD and CAT were significantly lower in the liver of hake than in sea bream. The concentration of LPO was higher in liver of hake and sea bream in comparison to white muscle. GSH was found in significantly higher concentration in white muscle of hake and sea bream in comparison to liver.

These changes of oxidative stress parameters point to tissue specificity, which is the consequence of different metabolic and antioxidative activity. Inter-specific differences were also established. These results suggest that the intensity of oxidative stress was higher in the liver in comparison to the white muscle, which is the consequence of increased presence of pollutants in water of the investigated locality.

Improvement of Activated Sludge Characteristics in the Model Experiment

Liudmila Usachova
Associate Professor, Brest State University, Republic of Belarus
Katsiaryna Usachova
Student, Belarusian State University, Republic of Belarus

The very actual problem to solve is activated sludge bulking at wastewater treatment plants. Such process was observed at the city of Brest treatment plants, Republic of Belarus.

The presence of bulking process was proved by following characteristics: a considerable sludge volume (82%) after sedimentation, high value of sludge index (846,2 cm3/g) and low value of sludge dose (0,98 g).

Unit load per 1 gram of activated sludge within the aerotanks was calculated – it amounted 696,82 mg/g per day, the rate of biological oxygen demand in 5 days was used for this purpose. Such load value was described as a high one.

Hydrobiological analysis detected mass growth of filamentous sulphur bacteria. The 8 observed species were identified, still 2 of them dominated – Thiothrix nivea и Eikelboom type 0961.

An experiment modeling the conditions for bulking suppression was carried out. The special laboratory equipment with original technique of its using was created. It allowed changing the performance of sludge load with wastewater and also regulating molecular oxygen concentration in the sludge mixture.

The experiment was conducted in 25 days. Filamentous bacteria amount decreased significantly after 4 days of experiment duration. What is more, the condition of sludge flakes was improved during the research. The fastest (by the 14th day) normalization of sedimentation properties of activated sludge was observed in the pilot jar where activated sludge and wastewater were mixed in proportion 3:1. Sludge index within the jars decreased in 7,1-16,2 times and had reached the normal values (71,4-129,0 cm3/g) by the 14-21st day.

To sum up, during the experiment the most favorable conditions were selected, which allowed suppression of the bulking process: increased oxygen concentration (6,0-8,0 mg/dm3) and sludge load decrease (to the proportion 3:1). The regeneration period of activated sludge in such conditions amounted to about 14 days.

Synthesis of Biodiesel from Sunflower and Waste Oils with Room Temperature Ionic Liquids

Gloria Villora
Full Professor, University of Murcia, Spain
Maria Alarcon Almudena
Full Professor, University of Murcia, Spain
Demetrio Gomez
Full Professor, University of Murcia, Spain
Manuel Rubio
Full Professor, University of Murcia, Spain

Biodiesel is part of the family of biofuels and is a term used to define a fuel used instead of diesel fuel and that is produced from a biological source. Although biodiesel has different chemical composition than diesel fuel, it exhibits some similar properties. In this work, we analyse the use of different ionic liquids as reaction media for enzymatic biodiesel production. The relationships between the reaction variables (conversion, product distribution and the effect of substrate molar ratio and water content) have also been examined.

Transformation of a New Pyrimidynyloxybenzoic Herbicide in Aerobic Soils

Haiyan Wang
Assistant Professor, Zhejiang University, China

A soil metabolism study of propyl 4-(2-(4,6-dimethoxypyrimidin-2-yloxy)benzylamino)benzoate (ZJ0273), a novel broad-spectrum herbicide, was carried out using 14C labeled on two different rings, i.e., [pyrimidine-4,6-14C] ZJ0273 and [benzyl-U-14C] ZJ0273. Ultralow liquid scintillation counting and LC-MS/MS were used to identify the degradation intermediates and quantify their dynamics in aerobic soils. Four aromatic intermediates, 4-(2-(4,6-dimethoxypyrimidin-2-yloxy)benzylamino)benzoic acid (M1), 4-(2-(4,6-dimethoxypyrimidin-2-yloxy)benzamido)benzoic acid (M2), 2-(4,6-dimethoxypyrimidin-2-yloxy)benzoic acid (M3), and 4,6-dimethoxypyrimidin-2-ol (M4), were identified and their identity was further confirmed against authentic standards. Analysis of metabolites suggested two degradation pathways: (1) Upon loss of the propyl group, M1 was produced via hydrolysis of propyl 4-(2-(4,6-dimethoxypyrimidin-2-yloxy)benzylamino)benzoate) after which the C-N bond between ring A and B was cleaved by oxidation and biochemical degradation to yield M3, which was further converted into M4 and finally mineralized to CO2; and (2) the first step was the same as in pathway 1, but M1 first underwent a carbonylation to form M2. The C-N bond between ring A and B of M2 was cleaved by hydrolysis to yield M3. Dynamic changes in the four metabolites in aerobic soils were also investigated by HPLC coupled analysis of radioactivity of isolated peaks. After a 100-d incubation, 1.7-9.7% of applied 14C was found as M1, 0.3-1.1% as M2, 14.5-20.9% as M3, and 3.7-6.7% as M4 in the soils, and pH appeared to be the most influential soil property affecting the formation and dissipation of these metabolites.

Influence of Pressure Drop on Particle Residence Time Distribution in a Fast Fluidized Bed

Tao Wang
Ph.D. Candidate, Tsinghua University, China
Xuan Yao
Tsinghua University, China
Junnan Chao
Tsinghua University, China
Hairui Yang
Tsinghua University, China

During the fast fluidized bed (FFB) operation, the bed pressure drop is usually a control index to be adjusted. It is directly related to the overall amount of the bed materials, thereby their residence time in the riser. Understanding the relationship between the pressure drop and the residence time of bed material is important to control the chemical reaction happening in the bed. In this study, a cold CFB experimental apparatus was built, with a riser of 10.4m in height and 0.102m in diameter. Quartz sand was used as the bed material and the bed was operated in FFB states. The axial voidage distribution and particle residence time distribution (RTD) in the bed were measured. Iron powders were used as tracer particles which were injected as pulse signal and captured with bed materials at the riser outlet. The influences of bed pressure drop on axial voidage distribution and particle's RTD were studied. Under experimental conditions, no S-shaped axial voidage distribution was found. This might be due to the high superficial velocity. As bed pressure drop increased, the voidage at given height decreased, indicating particle concentration became denser. Dense fast fluidization appeared in the entire riser when bed pressure drop exceeded a certain value. There was a narrow-banded peak and a long tail on the measured particle RTD curves. The increases of the bed pressure drop, or solid circulation rate, the peak was delayed and the distribution became broader, resulting in longer mean particle residence time.

Environment, Health and Risk: Sustainability in Uncertainty

Linda Whiteford
Professor, University of South Florida, USA
Graham Tobin
Professor, University of South Florida, USA
Carmen Laspina
Nacional de Promoción de la Salud, Ministerio de la Salud Publica, Ecuador

Natural disasters can have long-term debilitating impacts on society exhibited in high levels of contagious and communicable diseases, increased vulnerability, early death, decreased social capital and economic stress. The literature supports this, showing that exposure to disasters assaults sense of well-being, challenges security, and frequently leads to poor health. This picture is confounded by chronic hazards, situations where the ongoing nature of geophysical events can create multiple health impacts. Chronic hazards are defined as ongoing disruptive events, such as volcanic eruptions and their resultant ash fall, lava and pyroclastic flows, landslides, floods, lahars, and rockslides. These events may continue for many years, leading to long-term exposure to hazards. This research examined chronic exposure in communities around Mount Tungurahua in Ecuador over a ten year period. Data were collected using structured questionnaires, in-depth ethnographic studies of local residents, interviews with public health officials and political leaders, and evaluation of regional epidemiological and clinical records. Results suggest public health interventions in four areas: (i) integrated disaster planning to include a locally-based focus, extensive local community involvement, and inter-sectorial planning; (ii) health communication and promotion policies that facilitate vertical and horizontal communication and share information among government agencies, NGOs and local communities; (iii) coordination of aid at local, regional and global levels, among private and public inter-institutional relief groups, and identification of local contexts and international providers; and (iv) creation of a global culture of health and hazard mitigation planning that is dynamic, ongoing, culturally appropriate, that fosters comprehensive medical/public health training programs.

Simultaneous Wastewater Treatment and Odor Elimination in an Integrated A/O Reactor

Yi-Ning Wu
Associate Professor, Harbin Institute of Technology, PR China
Li-Jiao Ren
Graduate Student - Master, Harbin Institute of Technology, PR China
Nan-Qi Ren
Head, State Key Lab of Urban Water Resource & Environment, PR China
Zhao Li
Graduate Student - Master, Harbin Institute of Technology, PR China

An integrated A/O reactor combining UASB (Upflow Anaerobic Sludge Blanket) with MBR (Membrane Bioreactor) was developed for the simultaneous wastewater treatment and odor elimination. The reactor fed with synthetic brewery wastewater was operated for 80 days to investigate its removal efficiency for organic pollutants. The effluent COD (Chemical Oxygen Demand) concentration fluctuated between 40-140 mg/L but was lower than 80 mg/L most time while the influent COD concentration raised from 2239 mg/L to 7807 mg/L, indicating high efficiencies (~99%) were obtained at loading rate range from 7.3 kgCOD/m3·d to 25.3 kgCOD/m3·d. In order to treat organic and odorous compounds simultaneously, the reactor then was operated under different influent sulfate concentrations with constant influent COD of ~6000 mg/L. With the increase of the influent sulfate concentration (36.0-151.7 mg/m3), hydrogen sulfide (typical odor compound) at the inlet and outlet of the aerobic compartment (MBR) increased from 40 mg/m3 and 0 to 85.9 mg/m3 and 10.5 mg/m3 respectively, and the odor removal efficiency decrease from 100% to 87.0%. The hydrogen sulfide generated in the anaerobic compartment could be totally removed in the aerobic compartment when the influent sulfate concentration was lower than 85.4 mg/L, while the maximum influent sulfate concentration was ~125 mg/L so that the outlet concentration met the required standard (10 mg/m3, TJ36279). During this period, the effluent COD concentration was between 24.2~86.9 mg/L and the COD removal efficiency remained 98.7-99.6%. The correlation between the optimum dissolved oxygen (DO, mg/L) and the loading rate of hydrogen sulfide (Fv, kg/(m3·d)) was evaluated, DO = 1.31 + 0. 353 × Fv (R2 = 0.956), when the removal efficiency was higher than 90%. In addition, the removal rate of hydrogen sulfide followed the Michaelis-Menten equation, 1/R = Ks/(Vm·Cln) + 1/Vm, where the Michaelis constant Ks and the maximum removal rate Vm are 18.1 mg/m3 and 435 gH2S/(m3·d), respectively.

Separate Evolution of Hydrogen and Oxygen in Photocatalytic Water Splitting by a Novel twin Reactor

Jeffrey C. S. Wu
Professor, National Taiwan University, Taiwan
Chen-Chia Lo
Ph.D. Student, National Taiwan University, Taiwan

Photocatalytic water splitting with separate H2 and O2 evolution is crucial because it eliminates the explosion potential and hydrogen-purification cost. As shown in Figure, a novel twin reactor was designed to separate the evolution of hydrogen and oxygen in photocatalytic water splitting under visible light. A modified Nafion membrane was employed to segregate the two photocatalysts in the twin reactor so that hydrogen and oxygen can be evolved separately. Conventional Z-scheme catalysts, Pt/SrTiO3:Rh and WO3, were used as hydrogen-photocatalyst and oxygen-photocatalyst, respectively. Fe2+ and Fe3+ were added in the reaction solution as electron-transfer mediator. The ratio of evolved H2 and O2 was in agreement with the stoichiometric ratio (2:1) of hydrogen and oxygen of water. An average hydrogen generation rate of 1.59 μmol/g-hr was achieved in the twin-reactor system, which was twice as much as that in the conventional Z-scheme system. The improved H2 yield was due to the prevention of the backward water-splitting reaction in the twin reactor.

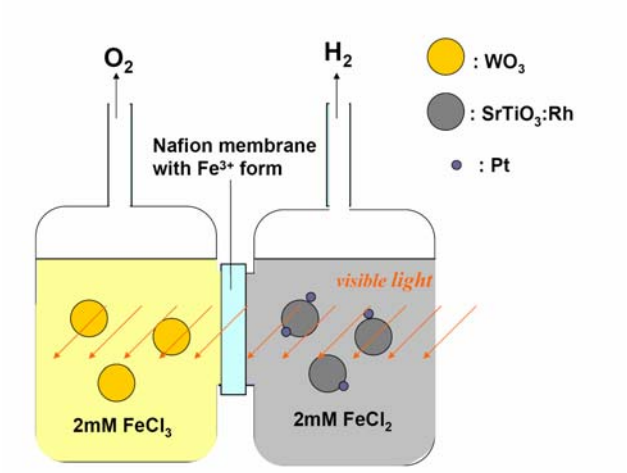

Figure: Schematic diagram of the twin-reactor system

Comparisons of Combustion Characteristics of Biodiesel from Vegetable Oils

Yo-Ping Wu
Professor, National Ilan University, Taiwan

Incorporation of LCA and GIS for Effective Environmental Planning Tool: Case Study in Malaysia

Sumiani Yusoff
Associate Professor, University of Malaya, Malaysia

The concern of environmental consequences due to improper development strategy is an emerging and becoming a common problem in many areas in the world especially for developing countries like Malaysia. Thus proper selection of planning tools needs to be incorporated to alleviate and minimise this pertinent problem.

In this study, the use of environmental planning tools for optimum solid waste landfill siting taking into account all environmental implications was carried out by applying Life Cycle Analysis (LCA) to enhance the research information obtained from initial analysis using Geographical Information Systems (GIS). The objective of this study is to identify the most eco-friendly landfill site by conducting a LCA analysis upon 5 potential GIS generated sites which already incorporated eleven important criteria related to the social, environmental, and economical factors. The LCA analysis utilized the daily distance covered by collection truck among the 5 selected landfill sites to generate inventory data on total energy usage for each landfill sites. The planning and selection of the potential sites were facilitated after conducting environmental impact analysis upon the inventory data which showed the least environmental impact.

Identification and Modification of Environmental Noise in Yazd Industrial Zone Setting

Mohsen Zarei
MSc, Shaheed Sadoughi University of Medical Sciences, Iran
Ruhollah Taghizadeh
MSc, Tehran University, Iran

Introduction: Improvement is a necessity and industries take part in a large role in developing process of each area. But what is its cost? Generally we can say that the environment is a remaining from the past that should be preserved for the next generations. Industries have made all the unfavorable consequences on the natural world. They have caused dangerous, biological, chemical, physical and environmental changes that have some negative effects on health and life of the living thing. The aim of this study was to evaluate the effects of industries on environment.

Material & Methods: Yazd Industrial town is investigated based on theses factors: Environment sound pollution and the effects on the setting has been detected. The significance of the effects and their domain is focused here.

Results: the finding showed that the mean level of noise in the Yazd industrial zone was different at the various time of day. And in the morning was higher than the other point of daytime. In the morning the level of sound was higher than the standard.

Conclusions: suggest that the efforts of the industrial zones are to try to stop noisy technical resources. On the other hand their inactivity in order to stop sound pollutions made by the activities, have an influence on the environment of that area. In the field of their progress with the focus on teaching personnel, performance control, installation of the control systems, etc, cooperation and collaboration of private and state environmental agencies are loaded and stressed.

Impact of Environmental Pollution on Human Health of the Population which Lives Nearby Kosovo Thermo Power Plants

Lulzim Zeneli
Assistant Professor, University of Prishtina, Kosovo

The most abundant natural resource in Kosovo is Lignite, the type Coal which type was extensively used in the thermo power plants. Coal are one the largest deposits of fossil organic material where metal accumulations have been observed. The Trace Elements in coal that could have an undesirable environmental impact include Hg, Pb, Be, Se, As, Cd, Cu, Ni, Zn, Cr, Ge, Mn, V, Co. Dust (flying ash) and bottom ash are one the main components of the environment pollution, which results from the industrial area of Thermo Power Plants "Kosova". Analysis of the emission of the flying ash from Thermo Power Plants "Kosovo" during 2005 has exceeded EU standards by 400-500 %. In a comparative study of biochemical parameters in blood of human population of two different environments in Kosovo, one done near by the Kosovo Thermo Power Plants in Obiliç, a highly polluted environment IG (Investigation Group) and the other that is considered as relatively clean rural environment in Dragash , CG (Control Group). The results that where achieved in this study showed the significant difference in average lead and cadmium concentration in blood of the investigation group from a control group.

The level of lead in blood at IG in geometric average was 46.05 μg / L while the CG is 17.76 μg / L ($p = <0.0001$, $t = -6.1$), while the level of cadmium in blood at IG in geometric average was 1.56 μg / L and the CG is 0.73 μg / L ($p = 0.0006$, $t = 3.34$). Impact of the environmental pollution on human health of the population is clearly reflected in the change of biochemical parameters between and IG and CG as: DB-Direct Bilirubine ($t= -2.24$, $p= 0.01$), TP-Total Protein ($t= -2.27$, $p=0.01$), AST-Aspastat aminotrensferaza ($t= +2.74$, $p= 0.003$), ALT- Alanin aminotransferaza ($t= +4.95$, $p= <0.0001$), CKMB- Creatin Kinaza MB ($t= -2.1$, $p= 0.01$), ChE-Cholenisteraza ($t= -2.62$, $p= 0.005$), GGT- Gamma-glutamyl transpeptidase ($t= -2.02$, $p= 0.02$) in human organism.

Based on the achieved results, it can be concluded that the pollution which from Kosovo Thermo Power Plants by flying ash and bottom ash has a direct effect on human health of the population which lives in the industrial area in Obiliç.

Urban Transport and Local Carbon Management in Beijing

Pengjun Zhao
Research Fellow, University of Groningen, the Netherlands

Managing city carbon emissions is a mission of China's local governments to respond the national strategy of mitigating climate change. In the current motorization process, urban transport in China's cities has become a main sector of fossil fuel-based energy consumption and thus a key source of greenhouse gas emissions. Urban transport should be a key issue of local carbon management in China. This paper has an aim to reveal the implications of transport policy for local carbon management in China's cities, looking at the case of Beijing. A comprehensive model is used to estimate the transport energy consumption and greenhouse gas emissions in the year 2030. Six different scenarios, which result from alternative scenarios of transport policies, are evaluated. The results of modeling are used to discuss the performances of current transport policy with respect to reduction of greenhouse gas emissions; to make policy implications of local carbon management; and to update government's concerns of local environmental policy. In addition, the environmental effects of motorization tend to be overlooked by China's local governments, who have great concentrations on advocating new automobile industry and gaining local revenue. Hence, the government failures in local carbon management are also discussed in view of urban transport in this paper.