

A01: Behavior of Iodinated X-ray Contrast Media in Lake Biwa – Yodo River Basin and Water Chlorination Process

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Iodinated X-ray contrast media exist at relatively high concentration in the aquatic environment. These compounds may be transformed into toxic iodinated disinfection byproducts during chlorination process. In this study, a survey on iodinated X-ray contrast media and absorbable organic iodine (AOI) concentration was conducted in the Lake Biwa–Yodo River Basin. Iodinated X-ray contrast media concentration and their contributions to AOI tended to be larger in the downstream area (contributions: up to 20%) than in the upstream area. Also, the reactivity of iodinated X-ray contrast media to chlorine highly depended on their specific chemical structures. In addition, the reaction rate of iopamidol and chlorine was high enough to transform iopamidol to different compounds in the time scale of typical water supply systems.

A02: Occurrence of N-nitrosamines and their precursors on chloramination and ozonation in water supply in Japan

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Occurrence of N-nitrosamines (N-nitrosodimethylamine (NDMA), N-nitrosomorpholine (NMor) and N-nitrosopyrrolidine (NPyr)) in raw and finished waters at 19 water purification plants were investigated. NDMA was detected in 11 of total 36 raw waters and 9 of total 36 finished water. NMor was detected in 4 of total 36 raw waters and 4 of total 36 finished water. NDMA and NMor were detected in all ten sewage effluents and the waterway which is located just downstream of effluent from a factory. NPyr was not detected in all samples of purification plants and effluents. The number of samples whose NDMA concentrations increased after chloramination was larger than those after ozonation. In case of NMor, NMor concentrations in the samples did not increase after chloramination or ozonation. NPyr concentrations in the samples did not increase after ozonation, but increased after chloramination in some cases. The effects of ozonation time on NDMA formation were examined using three different samples. For all samples, NDMA formation became stable when dissolved ozone in the samples was detected.

A03: Survey on the Concentration of Amino Acids in Source Water

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Disinfection byproducts such as trihalomethanes, haloacetic acids and trichloramine are produced from amino acids during chlorination. Amino acids are important in water quality management as control of residual chlorine concentration and bacterial regrowth. In this study, the concentration of free amino acids and total amino acids of 15 purification plant influent were measured in the fall of 2010 and the winter of 2011. The average concentration of free amino acids and total amino acids were 0.106 μM and 4.01 μM in fall, 0.056 μM and 1.36 μM in winter. In free amino acids, the most dominant amino acids species were glycine, serine and alanine. In total amino acids, the most dominant amino acids species were glycine, serine, alanine, asparagine acid and glutamine acid.

A04: A Study on Shape of Distribution Behavior Control Weir for Suspended Substances in Tee Branch at Pipeline

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In waterworks, pipe cleaning with drainage is executed to take out suspended substances from a water distribution network. If suspended substances can be accumulated in a specific place in a pipeline network, the amount of drainage necessary to cleaning is decreased and efficient pipe cleaning work becomes possible.

In this paper, shape of branch, which enables sand to flow into the branch side on ductile iron fittings, was studied by using numerical fluid dynamics model with multiphase flow. We conducted experiments using a weir with the shape which showed the best efficiency in numerical analysis. And it was confirmed that the effect on distribution of sand to brunch side was improved to its maximum. It was also shown by experiments that combining several weir fitted branch pipes increased the amount of sand flowing into a branch side.

A05: Contributions of odorous substances to the chlorinous odor of chlorinated Water

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Chlorinous odor is a major concern of water consumers even in the areas covered by advanced drinking water treatment systems. Among the various odorous compounds in drinking water, trichloramine and N-chloroaldimines are believed to be major contributors to chlorinous odor. In this study, the contributions of these compounds were evaluated with a headspace-GC/MS technique. It was found that the contributions of trichloramine and N-chloroacetalimine were approximately 20% and 10-20%, respectively.

A06: Characteristic of LCFA inhibition as revealed by microbial community structure analysis

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Inhibition of long-chain fatty acids (LCFA) was investigated using LCFA-acclimated sludge and non-LCFA-acclimated sludge. Resistance against saturated LCFA such as palmitate (C16:0) differed between the sludges unlike unsaturated LCFA such as oleate (C18:1). After construction of rRNA gene clone libraries and quantification of Bacteria and Archaea, it was found that resistibility against LCFA depends on community structure of Archaea even at strain level. Furthermore, it was suggested that lytic effect of LCFA first appears on Bacteria, not Archaea, in complex microbial communities when sludge was exposed to high concentration of oleate.

A07: Performance and microbial community of anaerobic closed digester treating palm oil mill effluent (POME)

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Palm Oil Mill Effluent (POME) is discharged during palm oil processing. POME is low pH and contains high concentration of COD with high lipid, protein, and carbohydrate concentrations; and therefore, POME is very recalcitrant wastewater for methane fermentation. In this study, we investigated the performance of commercial-scale anaerobic closed digesters treating POME in Malaysia for two months. POME was treated well in the anaerobic digesters in terms of total and soluble COD removal efficiencies (73% and 93%, respectively). Microbial community analysis revealed that archaeal community was predominated by Methanosaeta and microorganisms belonging to Firmicutes and Bacteroidetes are major bacteria in this system. In addition to sugar and amino acid degraders, long-chain fatty acid oxidizers belonging to Syntrophomonadaceae were also present in the system.

A08: Microbial Community Analysis in the Non-Dilution Thermophilic Methane Fermentation Reactor for Food Waste

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In this study, we continuously operated the single-stage thermophilic fermentation tank without adding water in order to treat food waste and determined the effect of microbial community due to the changes of operational conditions and addition of trace elements. The methane fermentation process could shorten the HRT to 30 days without the presence of VFA by combining the formation of ammonia and the addition of FeCl₂, NiCl₂, and CoCl₂ for the purpose of sulfide precipitation and the contribution of the essential trace metals. However, decreasing of pH and biogas production rate, resulted from accumulation of propionate by stopping the addition of NiCl₂ and CoCl₂, were observed. At this time, the existence ratio of hydrogenotrophic methanogens belonging to Methanoculleus has decreased in the methanogenic archaeobacterium community. Our data strongly suggested for a steady operation of thermophilic methane fermentation that the addition of trace metals could avoid the propionate generating bacteria to become a dominant species, and support the hydrogenotrophic methanogen to be formed in the metabolic system.

A09: Process performance of UASB-DHS system treating high concentration phenol wastewater and its microbial community analysis of UASB

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A lab-scale UASB-DHS system with a working volume of 11 L and 44 L was operated for treatment of a synthetic wastewater containing high levels of phenol for a period of 1,200 days. The total experimental duration of 1,200 days were divided into 4 distinct phases in terms of the influent phenol strength. The HRT of all phases were maintained at 26.5 hrs for the whole UASB-DHS system (9.2 hrs for UASB plus 17.3 hrs for DHS). The UASB-DHS system achieved an excellent removal of above 98 % at a loading rate of 2.8 kgCOD·m⁻³·d⁻¹. Two different pathways were suggested for degradation of phenol: conversion of phenol to acetate directly or via benzoate formation as an intermediate product.

A10: Development of a novel quick and simple method for quantitative detection of sequence-specific rRNA using molecular weight cut-off membrane

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We developed a quick and simple method for quantitative detection of sequence-specific rRNA using molecular weight cut-off membrane. After selecting appropriate membrane, fluorescent oligonucleotide probes hybridized with rRNA and non-hybridized probes were successfully separated. Detection and quantification of sequence-specific RNA were carried out by optimizing several hybridization parameters such as salt and probe concentrations, and hybridization temperature. Furthermore, it was demonstrated that this method can be used for quantification of rRNA extracted from environmental samples with high reproducibility.

- A11: Development of a novel sensitive fluorescence in situ hybridization (FISH) technique by using in situ hybridization chain reaction (in situ HCR)

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Highly sensitive fluorescence in situ hybridization (FISH) with enzymes or polynucleotide probes is routinely used to detect microorganisms with a low number of rRNA molecules. However, some cell-wall treatment is required for better penetration of these enzymes or probes. Here, we developed a new highly sensitive cell-permeable FISH technique by using in situ hybridization chain reaction (in situ HCR) with 3 oligonucleotide probes (approximately 50 mer). Applicability of rRNA-targeted in situ HCR was verified using *Escherichia coli*. The signals obtained using in situ HCR were more sensitive than those obtained using conventional FISH; however, this technique showed the same specificity as conventional FISH. Applicability of in situ HCR was further evaluated using a seawater sample. Tyramide signal amplification (TSA)-FISH and in situ HCR showed the same detection rates for the marine bacterium after cell-wall treatment (approximately 88%). Without the cell-wall treatment, in situ HCR showed a higher detection rate (mean, $80.1 \pm 4.8\%$) than conventional FISH (mean, $57.6 \pm 6.2\%$) and TSA-FISH (mean, $68.5 \pm 3.5\%$). These results indicate that the sensitivity of in situ HCR is almost as high as that of TSA-FISH; however, it shows higher cell permeability than TSA-FISH.

- A12: Evaluation of Dispersal Pattern of the Caddisfly *Stenopsyche marmorata* at the Catchment Scale by Microsatellite Markers

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For a robust river ecosystem at the catchment scale, we examined dispersal pattern of the caddisfly *S. marmorata* at the Middle of Miyagi prefecture by means of eight microsatellite markers. *S. marmorata* female fly to upstream against wind for oviposition after sunset while male flight pattern is random. We genotyped 532 larval samples collected from 30 reaches in adjacent four catchments in a 30 x 40 km² area. IBDs were showed positive significant correlation between Pairwise *F_{st}* and both airline distance and river line distance in Natori River. These result shows *S. marmorata* adult dispersal pattern was not limited along the river line because of male random dispersal or wind direction at female flight time. Genetic spatial autocorrelations showed *S. marmorata* dispersal distance was less than 10.5km at airline distance using all sites. In case of sites were less than 137m, *S. marmorata* disperse less than 7km. These distances were same to reported female dispersal distance. We believe those genetic analysis were helpful for recovering from artificial habitat sepaletions.

- A13: Characteristics of crossing distribution and the preference conditions on habitation of *Deiratonotus japonicus*

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This study paid attention to *Deiratonotus japonicus*, and field surveys and laboratory experiments were carried out to make clear the relation between the habitat of *D.japonicus* and aquatic environment in the Kita. Based on these survey and experimental results, influences to habitation of *D.japonicus* by the environmental condition in the Kita were discussed. Major conclusions in this study are as follows: (1)The density of *D.japonicus* decreases in the area over middle water level, (2)*D.japonicus* inhabits the place where mean diameter of riverbed materials is the middle sized gravel, (3)Preference curve on three environment factors (salinity, riverbed materials and water level) is shown by the results of field surveys, (4)Preference of *D.japonicus* is examined by laboratory experiments, the results show that riverbed materials over the middle sized gravel seem to play a role as their hiding place and feeding area.

A14: Organic Matter Sources in Sediments of *Zostera japonica* Beds and Nearby Sandy Areas

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Zostera japonica may be the main organic matter source for tidal flat sediment. The objective of this study is to clarify the influence of *Z. japonica* on sedimentary organic matter on the basis of Ignition loss, carbon and nitrogen stable isotope ratio and fatty acid structures. It is revealed that the quantities of sedimentary organic matters in *Z. japonica* beds are not different from those in nearby sandy areas. However the sources of sedimentary organic matters in the *Z. japonica* beds differ from those in nearby sandy areas. This result suggests that the formation of *Z. japonica* beds in the tidal flat leads to an increase in the qualitative diversity of the sedimentary organic matter. Furthermore, our study suggests that *Z. japonica* affects the benthic ecosystems in nearby sandy areas because *Z. japonica* beds supply the organic matter of *Z. japonica* to the nearby sandy areas.

A15: Composition and Origin of Particulate Organic Matter in the Upper-Reach River Sediment of Ibi River and the Impacts of a Newly Constructed Dam

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To investigate the composition of particulate organic matter (POM) in riverbed sediment of forest rivers and the impacts of newly constructed dams, investigations were conducted by targeting on the upper-reach Ibi River, on which the newly constructed Tokuyama Dam has been under operation for about one year. The investigations were conducted from May to November 2009. Analysis of data including the data for the stable isotopes of nitrogen and carbon demonstrated that for the fine particulate organic matter (FPOM) with sizes in $1\mu\text{m}\sim 1\text{mm}$ in the upper reach sites before the dam and that in the downstream sites after the dam, allochthonous species constituted for a main proportion. For the large particulate organic matter (LPOM) that can be easily distinguished by eyes, the accumulation on the riverbed was found to be increased in the downstream sites after the dam (except for the site immediately beneath the discharge date of the dam) in the litterfall season when the water flow rate at the sites is below 0.2 m/s, and was found to be the dominant fraction of the whole POM.

A16: Influence of Changing of Waterline Environment on the Habitat of *Phragmites australis*

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The purpose of this study is to examine the effect of the change of waterline environment in a tidal river on the habitat of *Phragmites australis*. Also, a mathematical model to describe the population dynamics of *P. australis* is defined and compared with survey data. Field survey to investigate the distribution of *P. australis* were carried out in the Ushizu River. The results indicated that the waterline zone of a maximum of about 6% disappears in the riverbank under the global warming. In addition, it was shown that the distribution of population density changes in response to the change of waterline as the habitat boundary. Though the field survey data regarding to the distribution of *P. australis* is scattered, the numerical results agree with the data roughly. Further, the simulation showed the possibility of regime shift of *P. P. australis* in the riverbank by the change of upward waterline.

A17: Fish Preference of Herbivory against Submerged Macrophytes and Effect of Fish Weight on Herbivory Rate

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Although the effect of fish herbivory is concerned for the regeneration of submerged macrophytes, it is little known about the herbivory characteristics of the plants. In this study, the characteristics of four kinds of fish (*Lepomis macrochirus*, *Carassius langsdorfii*, *Acheilognathus melanogaster* and *Pseudorasbora parva*) against two kinds of submerged macrophytes (*Hydrilla verticillata* and *Potamogeton perfoliatus*) were evaluated. *Lepomis macrochirus* and *C. langsdorfii* showed herbivory against both of the submerged macrophytes, but *A. melanogaster* and *P. parva* not. The herbivory test of *H. verticillata* using *L. macrochirus* and *C. langsdorfii* with various weights showed that the herbivory rates and volumes depended on the weight. These results indicated the importance of fish herbivory evaluation based on the number of fish and the weight per one fish.

A18: Effects of Position of Orifice on Continuous Migration of Fish

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Izumi pointed out that orifice is used by not only demersal fish but also non demersal fish. Onitsuka pointed out that suitable transverse position of orifice for migration of oikawa is center and suitable vertical position of orifice is bottom. However, there is little information on the suitable orifice position for continuous migration of fish. In this study, orifice in a pool-and-weir fishway is set up continuously to the edge or center of the bottom of bulkhead of pool. It was found that when orifice is set up continuously to the edge of the bottom of bulkhead of pool fishway, continuous migration rate becomes high.

A19: Estimation of Deposition Fluxes of Diatom Cells in Stagnant Water Areas of Chikugo River System

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It has been suggested that an increase of the stagnant water areas in a terrestrial area decreases the amount of dissolved silicate (DSi) load in the coastal area and causes a change in the dominant phytoplankton species there. In this study, seasonal changes of deposition fluxes of diatom cells at three stagnant water areas such as Egawa dam, Terauchi dam, and Chikugo ozeki weir on the Chikugo river system were estimated using diatom data observed in 2009 and a diatom cell volume database. Although these areas are located along the same river system, each area has distinct characteristics with regard to seasonal changes in deposition fluxes of diatom cells and the total amounts detected by the traps. Fluxes in Egawa dam and Chikugo ozeki weir both showed increases in early summer season, whereas that in Terauchi dam increased in the winter season. In addition, the maximum flux in Chikugo ozeki weir was respectively about 21 and 31 times larger than the amounts found in Egawa and Terauchi dam. This difference can be attributed to the higher DSi and TP concentrations in the inflows to Chikugo ozeki weir compared to those in the other water areas.

A21: Distribution of Antibiotic Resistant Escherichia coli in Chao Phraya River and Its Tributaries in Thailand

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Distribution of Escherichia coli strains resistant to sulfamethoxazole (ST), tetracycline (TC), and fluoroquinolones (levofloxacin, norfloxacin, and ofloxacin) was surveyed in Chao Phraya River and its four tributaries in Thailand. Of all isolated strains, 14–17% of isolates were resistant to fluoroquinolones; 43% were resistant to ST; 51% were resistant to TC. No significant correlation was found between ratios of antibiotic resistant isolates and antibiotic concentrations in river water. However, ciprofloxacin, which was a fluoroquinolone found to be widely distributed in the target river, possibly relates to distribution of E. coli isolates resistant to other fluoroquinolones by cross-resistance. Wide distribution of a multiple resistant gene of ST and TC was implied because 92% of ST resistant isolates had simultaneous resistance to TC.

A22: Natural Attenuation of Pharmaceuticals and Personal Care Products in an Urban River

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There is increasing interest in unintentional reuse of treated wastewater because of worldwide water scarcity. Planning an effective unintentional reuse system requires knowledge of natural attenuation of harmful chemical compounds during the river transport. Fifty three Pharmaceuticals and Personal Care Products (PPCPs) recently recognized as a group of emerging contaminants were selected to be target compounds in this study. Attenuation of PPCPs along a river stretch was quantified from the result of river survey for six months. Ketoprofen showed relatively high attenuation rate constant ($k=1.35[h^{-1}]$), followed by furosemide ($k=0.51[h^{-1}]$) and ciprofloxacin ($k=0.48[h^{-1}]$) among 35 PPCPs detected. As for ketoprofen, furosemide and diclofenac, there are positive correlations between attenuation rate constant and sunlight intensity UVB, which suggests sunlight photolysis to be an important factor of attenuation among these three compounds.

A23: The evaluation of nutrient loads at forest watershed of Ijira River

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The investigations of water quality at forest watershed located at the upstream of the Ijira River, Yamagata city, Gifu prefecture, were conducted to evaluate the annual runoff loads of total nitrogen(TN) and total phosphorus(TP). The appropriate annual runoff loads of TN and TP were calculated using the following methods, constant-concentration-flow method, constant-concentration method, LQ method using either the logarithmic method or direct method. TN observed by the continuous observation of water level, the investigations carried out an interval of less than two weeks, and those calculated using LQ model were almost the same. TP observed by the continuous observation of water level, the investigations carried out an interval of less than eight days, and those calculated using LQ model were almost the same. These results suggested that the survey and the calculation we conducted here were proper to obtain the annual runoff loads of TN and TP in the Ijira River. TN contents from the forest watershed were higher than any other watersheds, whereas TP concentrations showed almost the same as the other watersheds.

A24: Evaluation of eggshell as calcium material for sulphuric ion removal in phosphorus material recovery process from chicken manure incineration ash

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In order to reduce the cost of chemicals used in the phosphorus recovery process from chicken manure incineration ash and to reduce concentration of chloride in wastewater, the use of eggshell as calcium material for CaCl₂ in sulphuric ion removal process was evaluated. The washing of recovered phosphorus materials with water was also conducted to improve phosphorus content in the recovered materials. The use of eggshell could reduce the cost of chemicals per weight of recovered phosphorus and the concentration of chloride in wastewater lower than the use of CaCl₂. Washing the recovered materials with water could increase the phosphorus content in recovered materials. There was little difference of phosphorus content in water-washed recovered materials between the use of eggshell and CaCl₂. The phosphorus compounds in recovered material at pH 6 and 10 were different between the use of eggshell and CaCl₂.

A25: A Study about the Introduction of Advanced Management of Nutrients for Enclosed Sea

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In order to study management of nutrients for the harmony with buildup of biological productivity and aquatic environment, we calculated weather conditions and variations of nutrient loads flowing into Hakata Bay during the days when red tide was occurred. Furthermore, we estimated the nutrient loads required for reducing red tide frequency and considered ideal methods for nutrient management in an enclosed sea. Recent sewage treatment decreasing phosphorous and T-P loads were corresponded with the reduction of red tides caused by Diatoms and Raphidophyceae. On the other hand, the frequency of red tides caused by Dinoflagellates was high and lasted for longer periods. The control of red tides at the time of high precipitation was difficult unless T-P loads could be reduced by improving sewage treatment levels or controlling the loads from non-point source. When precipitation was low, the reduction of red tides was possible with present loads. However, phosphorus loads in a dry season were run short to the requirements that red tides could be controlled. Essentially, the concentrations of nutrients required for the healthy maintenance of the bay ecosystem were differed seasonally. We will continue to study proper load levels and effective management of nutrients in the future.

A26: Stable isotope analysis of water contamination in reclaimed farmland areas of Kasaoka bay

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Nitrogen (N) and phosphorus (P) concentrations have been reported to be high in the main drainage canals in the reclaimed areas of Kasaoka Bay, where livestock farming is the most common form of agriculture. In the present study, water quality was monitored bimonthly from May 2009 to February 2010 and monthly from March to October 2010 at four or five sites in each of three branch canals running through farmland areas with different uses: (i) grassland, (ii) livestock and forage crops, and (iii) livestock, forage crops and horticulture. Concentrations of total N and P in water were higher for land use in the order of (ii) livestock and forage crops > (iii) livestock, forage crops and horticulture > (i) grassland. We also investigated the mechanism of N contamination by analyzing stable isotopes in drainage water, soil plots in all areas, and forage crops in area (ii). Abundances of natural fractions of ^{15}N ($\delta^{15}\text{N}$) and ^{18}O in nitrate-N indicated that N contamination in canals could be attributed to the high rate of manure compost application on fields of forage crops owned by livestock farmers in areas (ii) and (iii) and the fact that ammonia volatilization and/or denitrification occurred in the fields and/or in the canals. Further, ammonia volatilization from a cowshed was inferred based on significantly lower $\delta^{15}\text{N}$ values in orchard grass and soil in plots closer to the cowshed. The present study indicates that excess application of manure compost causes N contamination of water and that ammonia volatilization from livestock affects soil N in reclaimed land.

A27: Development of 44nm ^{14}C -labeled silicanano particles PBPK Model for ICR Mice

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Although public concerns increase over nano-materials, we have not yet acquired the knowledge on not only toxic mechanism, but also absorption, distribution and target organs. For that reason we targeted silicananoparticles, of which annual production is over 90 thousands metric tonnes in Japan, and studied the pharmacokinetics developed PBPK (Physiologically-based Pharmacokinetic) model to estimate the target organs. Forty-four nm ^{14}C -labeled silica particles were prepared and injected to ICR mice (male, 8 weeks old) by vein or intratracheal administration. The result showed that the concentration of the silica particles was the highest in spleen, followed by liver for 44nm. Based on these experiments, we developed Physiologically-based Pharmacokinetic (PBPK) model for mice and humans. The PBPK model for humans predict that the target organs would be spleen and lung.

A28: FATE OF $^{17}\beta$ -ESTRADIOL DURING BIOLOGICAL SAND FILTRATION: EFFECT OF FILTRATION RATE AND TEMPERATURES

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Fate of $^{17}\beta$ -estradiol (E2) during biological sand filtration was investigated by a series of continuous flow experiments for treating surface river water spiked with E2. The likely impacts of filtration rates and temperatures were examined for combinations of these two variables at the filtration rates of 2.4, 4.8, 12 and 24 m/d and the temperatures of 5, 16 and 20 °C. Under all experiment conditions, estrone (E1) was detected as a biotransformation product of E2, indicating that there were bacteria species in the biofilms of the sand filters that can degrade E2. The half-life of E2 ($t_{1/2}$), which was estimated from the parameters of the first-order reaction equation combined into a complete mixing model, showed that the disappearance of E2 took place faster when the filtration rate was smaller and the temperature was higher. Compared to the biofilms attached onto the sand media in the top layers, the biofilms in the lower layers demonstrated slow degradation rate for E2, with the degradation rate revealing a profile in similarity with the density profile of either heterotrophic bacteria or general bacteria.

A29: Simultaneous occurrence of methanogenic benzene degradation and trichloroethylene dechlorination by enrichment cultures

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Benzene and chlorinated ethylenes are major pollutants of groundwater and soil among volatile organic carbons. There are sites polluted by both chemicals, but currently no bioremediation techniques are available to clean up such sites at once. In this study, we mixed benzene degrading cultures and trichloroethylene dechlorinating cultures which were established in our previous study, and added both benzene and trichloroethylene to investigate whether benzene degradation and trichloroethylene dechlorination proceed simultaneously under anaerobic condition. As a result, we revealed that these two reactions can proceed simultaneously, and the benzene was degraded as a methanogenic reaction. We also observed the decrease of benzene degradation rate in some cases, which might suggest the negative effect of vinyl chloride accumulation.

A30: Short-Term Chronic Toxicity Tests Applied to River Water Contaminated by Treated or Untreated Domestic Sewage

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In Japan, chemical substances under regulation is limited to 27 compounds and 15 items for effluent and 26 compounds and 10 items for environmental standard. Numerous kinds of chemical compounds released in domestic sewage such as pharmaceuticals and surfactants were not evaluated for their effects on aquatic organisms. We used the short-term chronic toxicity protocols in USEPA's whole effluent toxicity (WET) to evaluate the toxic effects of the river water sampled in Tokushima, Kyoto, and Saitama, where highly affected by treated or untreated domestic sewage. The bio-assays were conducted twice for each samples collected in between July 2010 and February 2011. As results, no growth inhibition was found for green algae (*Pseudokirchneriella subcapitata*) but was rather promoted the growth probably due to the relatively high concentrations of nutrients. In contrast, at least one of mortality and reproductive effects were found for *Ceriodaphnia dubia* for approximately a half of the 24 samples. Particularly strong mortality was found for the samples collected in Kamo River and Ayase River of Saitama. Hatching and survival of zebrafish (*Danio rerio*) was significantly affected in the all four samples collected in Tokushima area.

A31: Development of Simple Extraction and Pre-treatment Methods for Particulate-Phase Perfluorinated Compounds in Wastewater Samples

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Main objective of this study was to examine a simple and effective analytical method for particulate-phase perfluorinated compounds (PFCs) in wastewater samples. Activated sludge and dehydrated cake samples were used for evaluating the effectiveness of accelerated solvent extraction, solvent-shake extraction, and sonication extraction for analysis of twelve PFCs. In addition, PFC-II cartridge and Envi-Carb cartridge were tested to avoid matrix effects. As a result; 1) Methanol-shaking followed by Envi-Carb treatment provided the best recovery (59–123%) and relative standard deviation (less than 20%). 2) In comparison with previous studies, the developed method was simple and time-saving as well as showing high accuracy and precision. 3) Six wastewater samples analyzed by this method showed high recovery (77–112%) indicating that this method can be applied to various type of wastewater samples.

A32: Biodegradation of polylactide under thermophilic and hyperthermophilic anaerobic digestion condition

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The biodegradation of polylactide (PLA) under an anaerobic digestion condition was evaluated by batch experiments. It was found that transformation of PLA to lactic acid was obviously promoted and more existence of ammonia enhanced the transformation dramatically. When the PLA was used as the only organic substrate for thermophilic (55° C) anaerobic digestion, it was difficult for microbes to utilize the PLA to produce methane gas. After 60 days treatment, the net methane conversion ratio of the PLA was 11.7%. Co-digestion of the PLA and kitchen garbage (KG) promoted the biodegradation of the PLA with the net methane conversion ratio of 49.8% after 60 days treatment. After hyperthermophilic (80° C) pretreatment with anaerobic digestion sludge and ammonia of 4 g N/L, the biodegradation of the PLA was promoted greatly. The net methane conversion ratio of the PLA was 81.8 % after 22 days thermophilic anaerobic digestion.

A33: Enrichment and molecular analysis of denitrifying anaerobic methane oxidizing microorganisms using nitrate or nitrite as electron acceptor

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Denitrifying anaerobic methane oxidizing microorganisms were enriched using continuous and batch cultures fed with nitrate or nitrite as electron acceptor. After the several month of cultivation, continuous enrichment cultures using nitrite showed remarkable simultaneous methane oxidation and nitrite reduction. Denitrifying anaerobic methane oxidizing bacteria belonging to uncultured phylum NC10 was detected in not only nitrite-fed bioreactor but also nitrate-fed bioreactor by fluorescence in situ hybridization. In nitrite-fed bioreactor, about 68% of total microbial cell was bacteria and no archaeal cell was detected. But for nitrate-fed bioreactor, 58% of total microbial cell was bacteria and archaeal cell was accounted in 7% of total cell numbers. These results indicate that nitrogen source strongly affected the microbial community structures in denitrifying anaerobic methane oxidizing consortia.

A34: Identification and abundance of anaerobic protozoa in an UASB pilot plant treating domestic municipal sewage

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Identification of anaerobic protozoa was carried out by phylogenic analysis of 18S rRNA gene sequences to sludge samples in a pilot plant UASB fed with domestic municipal sewage. Abundances of each protozoan species were measured by microscopic direct counts throughout three years. *Metopus contortus*, *Metopus palaeformis*, *Trimyema compressum* were consistently predominance as a protozoan in the UASB during the experimental period. Total cell number of the protozoa shifted from 1.1×10^4 cells/mL (fall) to 0.0 cells/mL (spring) with changes in temperature of the sewage. 16S rRNA gene cloning to DNA extracted from one cell of *Metopus contortus* picked up with a micro-manipulator revealed that *Methanoregula* and *Methanoseta* were observed in the cell as a symbiotic bacteria.

A35: Combined Hyperthermophilic Solubilization and Thermophilic Anaerobic Digestion Process for Coffee Ground Treatment

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An anaerobic digestion process that consisted of a solubilization reactor at a hyperthermophilic (80° C) condition and a methanogenic membrane reactor at a thermophilic (55° C) condition in series was developed for treatment of coffee ground. Laboratory-scale reactors were operated continuously for 100 days, and batch experiments were performed to evaluate effects of operational conditions on solubilization and methanogenesis performances. The continuous operation at an organic loading rate of 6.5 kgCOD/m³/day was stable with COD based methane conversion efficiency of 41% and VS removal ratio of 70%. The batch experiments showed that NaOH addition and filtrated liquor from the methanogenesis reactor promoted the solubilization at the hyperthermophilic treatment.

A36: Thermodynamic-kinetic approach to simulation on inorganic solid precipitation in thermophilic anaerobic digestion

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Anaerobic digestion process gains attentions as an energy-producing and waste-reducing technology in which methane fermentation bacteria degrade organic waste to produce methane gas. As the technology and its operation methods advance, organics digestion rate is improved, and non-degradable inorganics accumulate to reach saturation and precipitate as inorganic solids. Solid-aqueous composition should be monitored for good operation practice because solid and aqueous portions of digestion effluent are treated separately. A prediction model for complex inorganic solid precipitation in anaerobic digestion was developed by thermodynamic and chemical kinetic approach. This model successfully reproduced aqueous P, Ca and Mg concentrations of 15 samples from 6 different thermophilic anaerobic digesters, and this manuscript described how to conduct activity coefficient incorporated thermodynamic computation on a spreadsheet program (e.g., MS Excel) to predict equilibrium concentrations in anaerobic digestion liquor.

A37: Spatial variation in muscle elemental content of crucial carp (*Carassius auratus langsdorfii*) in Miharu dam lake, Fukushima, Japan

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It is well known that lake dwelling fish species often play ontogenetic and/or diel migration. And also, they must change own habitat caused by artificial water level manipulation in many dam lakes. Unfortunately, there was little investigation that such passive seasonal fish movement patterns because of their apparent migratory complexity. We conducted to develop a method for determination of each individual habitat using muscle elemental composition analysis by inductively coupled plasma mass spectrometry (ICP-MS). Significant differences were shown in mean elemental ratios of muscle of 5 groups in the study lake. The result shows that body elemental composition is a potential tool for identifying the small scale freshwater fish local-populations with different habitat use histories.

A38: On the Growth Inhibition of the Toxic *Microcystis aeruginosa* Affected by the Exposure Time of Water Soluble Extract Solution from Cherry Tree Dead Leaves

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Relative to the growth control or inhibition of the toxic cyanobacteria like *Microcystis aeruginosa* (M.a.), the factors affecting were examined supposing the effects of the condensed tannin (CT) from the water soluble extract (WSE) solution that was obtained by immersing the cherry tree dead leaves into DI water. Accordingly, the growth inhibition effect would be affected by the initial condensed tannin loading intensity per M.a. cell (CTLI, pg-CTch/cell) and the exposure time of the M.a. cell with the WSE solution. And the product of the initial CTLI and the exposure time would affect the cell growth control. When the product is set at higher than 20~30 pg-CTch·hr/cell, then the cell growth inhibition would take place. Furthermore, an effective growth inhibition by the WSE solution addition would need an exposure time of at least 2 or 3 hours.

A39: The development of water resource system – The Water balance of Yamato River Basin –
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The system to estimate an amount of water resource using GIS data was developed. The water balance was analyzed by the systems using GIS data with 100m mesh scale, precipitation data and flow rate data of rivers. The amount of 10m³/sec water was actually supplied from the basin of the Kino River into the Yamato river basin. The estimated values for water balance was in good agreement with the actual measurement results including 10m³/sec water importing from the outside basin. The advantage of water balance analysis system was to include water supplies of sewage systems and drinking water. Therefore, the system can analyze water balance in a catchment using information of land use and industrial map.

A40: Quantitative consideration on pH rising factors in The Inawashiro Lake employing calculation method of pH titration curve

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The neutralization has progressed in the Inawashiro Lake since 1996. pH at the center of the lake was 4.8 in 1980 and reached to 6.8 in 2009. Although pH rising factors, such as changing of water balance at the watershed, decreased acidity provided through the Nagase River, increased alkalinity of other inflow water bodies, and primary production in the lake were identified, magnitude of the effect on pH of the lake by the factor has not been discussed and evaluated. Under the above situation, we tried quantitative analysis on pH rising effect of 1) water balance changes, 2) decrease of acid provided from the watershed, and 3) increase of alkalinity of the other rivers were conducted using the calculation method after verification of the method. The effect on pH of primary production in the lake was also estimated by comparing the calculated value by the proposed method with observed data. It was found that pH rising was firstly occurred by decrease of the acid supplied from the watershed and increase of alkalinity of the other rivers and then the pH rise was promoted by primary production in the lake.

A42: Bioaccumulation characteristics of POPs in various bivalves

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Field surveys were conducted with oysters, clams and scallops whose consumption amount accounted for much shares in the total consumption of shellfish in Japan. There were differences in isomer and metabolite compositions of DDTs and HCHs among the sampling areas, as represented by ratio of (DDE+DDD)/DDT in bivalves. It was found that there was no significant difference in bioaccumulation characteristics among oysters, clams, scallops, *Corbicula* and *Mytilus galloprovincialis*. Therefore, it was cleared that using the monitoring results with *Corbicula* and *Mytilus galloprovincialis* which are easily sampled in various water areas in the world, the bioaccumulation characteristics in oysters, clams and scallops, which are important for food, could be comprehended.

A43: Numerical analysis of environmental effects on the retention time of sea water in riverine estuaries

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Since retention time of sea water is one of the most important factors that control the environment in riverine estuaries, it is necessary to assess it accurately to understand the riverine estuary environment. However; complicated hydrodynamics driven by the combination of several influential factors make it difficult to estimate the retention time. Both temporal and spatial heterogeneity of saline water distribution enhance the complexity of the estimation. We have developed a numerical model that can analyze the temporal and spatial distribution of age and residence time of sea water in riverine estuaries. The model can differentiate salinity by the time when it enters river mouth and by the place where it exists at certain time, while the summation of the differentiated salinity is in agreement with conventional model results. We have shown the quantitative influence on the age and residence time of sea water in estuaries caused by changes in river channel, sea level and the river flow.

A44: Growing position of the rhizome in seagrass (*Zostera japonica* ASCHERS)

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We investigated the change in the topography of seagrass meadows of *Zostera japonica* Aschers in correlation with time. The chosen measurement methods were by surveying the micro-topography, by digging up the seagrass and by measurement of the change every month occurring in the micro-topography. The results show that the altitude in the community was 10~15cm higher than the outside community and the community's topography resembled a mound. Newer rhizome growing under the seabed of the mound elongated at shallower levels. In addition, rhizomes found in the depths of more than -6cm from the seabed were found dead, and remnant rhizomes were found at a maximum depth of -19 cm. The altitude in the community rose 10 mm on average. In contrast, altitude change in the outside of the community was stable with changes from -0.3~0.2cm only. From the above mentioned results, the seagrass meadows induce the sedimentation of sand and mud. Therefore the lateral shoot was buried with the progress of time, but we confirmed that the seagrasses endures the sedimentation of sand and mud by the growing new rhizomes at shallower levels of the seabed to maintain the overall depth of rhizomes.

A45: Numerical Prediction on Influences of Wind and Flood to Flow and Material Transport in Isahaya Flood Regulation Pond

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Wind and flood inflow are main factors which give influences to flow and material transport in closed water body. In this study, flows induced by wind and flood in Isahaya flood regulation pond were simulated using a three dimensional model. Numerical predictions were done under the meteorological condition observed in summer. Although this flood regulation pond is shallow water area, it is predicted that the circulation flows are formed in vertical plane, and flows compensating the balance of waters are appeared at middle and bottom layers. Materials which are initially set at northern area are transported to the central and southern water area of this pond by wind induced flow. On the other hand, flows are developed by the wind as well as the inflow of flood during a flood. Thus, particles set around river mouths and cut-off channels are transported up to around the central area of this pond.

A46: Environmental contamination by antimony and related health risks around a chemical fiber factory
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A chemical fibers factory located at Okazaki City was selected for field survey area. This factory was listed in PRTR as antimony release source to the atmosphere and aquatic environment. Antimony concentrations in soil, river water and suspended particle matter around the factory were determined.

The results obtained in this study were summarized as follows.

- 1) Total antimony concentrations in soil exceeded maximum natural abundance at many sampling site around the factory.
- 2) Valency of antimony in soil or river water was determined by APCDT extraction test. Antimony (V) was preferential valency in both soil and river water.
- 3) Sequential extraction tests were carried out for antimony contaminated soil. Residual fraction was the most dominant fraction, accounts 65 - 90%.
- 4) Antimony concentrations in river water didn't exceed the guideline level (20 μ g/L).
- 5) Physiologically based extraction tests (PBET) were carried out for antimony contaminated soil. The lower the simulated stomach solution pH is, the more antimony in soil extracted. The extracted antimony from soil increased with the time in both stomach and small intestine.
- 6) The amount of antimony extracted by PBET in stomach solution pH1.3 possibly exceeds that extracted by 1mol/L HCl (content test).
- 7) Total amount of antimony intake for inhabitant near the factory doesn't exceed the tolerable daily intake (TDI) for adult and children.

A47: Evaluation of mercury ion sorption on soils by column test

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Mercury sorption abilities of 4 kinds of soils (Kurotuchi-soil, Akatuchi-soil, Arakidado-soil and Masado-soil) are evaluated by column test, in order to prevent water and soil pollution because of leaching. Mercury solution (1 mg/L of HgCl₂) is poured into the soil layer, and the mercury concentration in the leachate was determined. The difference of them are treated as the quantity of sorption. Kurotuchi-soil showed the highest sorption ability, and Akatuchi-soil and Arakidado-soil is followed. After the experiment of 1200 hours, 1530 mg/kg-soils of mercury were sorbed on Kurotuchi-soil. Furthermore, much higher sorption ability is suggested based on the leaching concentration. The column test shows the similar results with the batch experiment. However, negligible differences are recognized for the mercury sorption ability of each soil between column test and batch test.

A48: Analysis of Retainment of the Tetrachloroethylene Solvent in Soil and its Infiltration

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Soil pollution by volatile organochlorine solvents, such as tetrachloroethylene and trichloroethylene is a serious environmental problem. The organochlorine solvent often exists with form of NAPL (Non-Aqueous Phase Liquid) in the soil. In this study, the retainment mechanism in unsaturated soil and the infiltration behavior of the tetrachloroethylene solvent were analyzed. The liquid existence ratio of three soils in the initial equilibrium and the after sprinkling equilibrium were measured and analyzed. Using water content ratio and pF which were a property value of the soil, an empirical equation for estimation of a liquid existence ratio in the initial equilibrium was suggested. The solvent liquid was hard to move with water underground infiltration, in sand, Kanto loam and black soil. It is suggested that the retained organochlorine solvent in soil infiltrate to underground while it is dissolving in saturation water.

A49: Continuous arsenite oxidation treatment by a bioreactor using arsenite-oxidizing bacteria

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The continuous arsenite (As(III)) oxidation was investigated with a cylindrical bioreactor including arsenite-oxidizing bacteria. The low cost As(III) oxidation process may become part of an As removal treatment for drinking water. The bacteria used for the bioreactor were isolated from activated sludge collected from an aeration tank at sewage treatment plant in Iwate prefecture and had 99.9% 16S rRNA sequence similarity with *Ensifer adhaerens*. Spherical polyvinyl alcohol carriers in which the bacteria were kept were included at a concentration of 30 or 100 mL per L of reactor volume for the basic condition. More than 95% of the As(III) was oxidized when the As(III) concentration was 1 mg-As/L and hydraulic residence times (HRT) were longer than 4 hrs. Additionally, the ability of the bioreactor to oxidize As(III) was not lowered even though inflow of As(III)-containing water was stopped for 7 days. At the increased As(III) concentration of 10 mg-As/L, the ability to oxidize As(III) decreased; only 60% of the As(III) concentration was oxidized for a HRT of 4 hrs. Therefore, it is necessary to change the operating conditions such as HRT for higher As(III) concentrations than 10 mg-As/L.

A50: Isolation and characterization of thermophilic lactic acid bacteria from sweet potato-based Shochu lees

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Ten lactic acid bacterial strains were isolated from sweet potato-based Shochu lees, which were just after the distillation, storage at air temperature, and treated by using reversible-flow anaerobic baffled reactor at 55°C. The isolates were identified as *Lactobacillus delbrueckii* subsp. *bulgaricus*, *L. zeae*, *L. casei*, *L. manihotivorans*, *Bacillus coagulans*, *L. amylolyticus*, *Thermoanaerobacterium thermosaccharolyticum*, *T. aotearoense* on the basis of 16S rRNA gene sequence. From the lactic acid fermentation tests and analysis of lactate enantiomers, six strains produced L-lactate, two thermophilic strains produced D-lactate and DL-lactate. The most of isolates produced lactate from the variety of carbohydrates determined with Api50 CH. From the Lactic acid fermentation tests in the batch cultivation, thermophilic isolates produced lactate faster than mesophilic isolates.

A51: Comparative Evaluation of Different Pretreatment Methods for Enzymatic Saccharification of Lignocellulose

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We investigated several pretreatments of biomass, which were pre-matured corn cultivated as a catch crop, water caltrop and rice straw, for enzymatic saccharification. Using alkaline oxidation, ammonia, hot compressed water and ionic liquid were compared as the pretreatments. Enzymatic saccharification using Meiselase after each pretreatment provided that alkaline oxidation was the most efficient pretreatment method on the tested biomass; glucose yields based on before-pretreatment biomass weight were 24.6 (corn), 9.1 (water caltrop) and 25.0% (rice straw), respectively. Glucose yield based on cellulose weight in before-pretreatment biomass was 89.3% in the corn case. Alkaline oxidation pretreatment was confirmed to be cost-efficient by the actual cost in the laboratory scale investigation.

A52: Diversity and succession dynamics of bacterial genes relating to the reduction of nitrous oxide (N₂O) emitted from composting processes

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Nitrous oxide (N₂O) is one of the most potent greenhouse gases and also concerned for its ozone-depleting effect. A large amount of N₂O is emitted from waste treatment processes such as composting. To obtain insights into denitrifying bacteria with N₂O-reducing potential, we analyzed diversity and succession of the denitrifying bacteria in composting processes by analyzing N₂O reductase gene, nosZ, as a molecular marker. The composting experiments were performed by traditional windrow method (method A) and a pre-treatment method at 100°C for 30 minutes prior to windrow composting (method B). Composting with method A proceeded mesophilically and shifted pH from alkaline to neutral, while composting with method B proceeded mostly thermophilically and under stable alkaline condition. In both methods, N₂O was emitted at the stage when nitrification and denitrification simultaneously proceeded. Results of quantitative real-time PCR analysis showed that the copy numbers of nosZ gene changed significantly during each composting process. The results of cloning analysis of nosZ genes amplified from the compost of each method composting showed that almost all nucleotide sequences were affiliated with novel nosZ phylotypes. The results indicate that denitrifying bacteria with N₂O-reducing potential are highly diverse and that their succession patterns of dominancy are largely affected by physicochemical properties of the composting.

A53: Utilization of Food Wastes (Shochu Lees and Starch Wastes) for Cultivation of Some Mushrooms and Adaptability of Waste Culture Media to Feed

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Previously we have shown that starch wastes are usable as mushroom culture medium through the cultivation of monkey head mushroom using shochu lees-starch waste media. In this study, cultivation of other mushrooms was tried for expanding the utilization of starch wastes. The results showed that the starch media were also usable as culture media for oyster mushroom and branched oyster mushroom judging from yield, constituent character etc. Fermented TMR containing shochu lees-starch waste was used for feeding sheep. The fermented TMR containing 5-10% waste were as effective as standard feedstuff on digestibility of fiber such as NDF and OCW, and ingestion of dry matter increased with the increment of waste media ratio in the feedstuff. Taken together, it is apparent that the fermented TMRs are similarly fed compared with standard feedstuff.

A54: Nutrients extraction from Biomass for Recovery and Recycle

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We have reported around 80% of phosphorus in corn can be extracted by soaking dry-powdered tissue in distilled water for 24 hours. In this paper, we discuss the process of phosphorus elution within 24 hours, and the elution of other nutrients such as carbon, nitrogen and potassium. The recovery efficiency of potassium was as high as that of phosphorus, and elution was almost completed just after the soaking in water. On the other hand, low recovery result was derived on carbon and nitrogen, and the elution of these two nutrients was rather slow to take about six hours to complete. We think the states and functions of nutrients in plant tissue made such difference in elution. Three kinds of aquatic plants were subjected to the same nutrient extraction experiment in order to evaluate if this extraction procedure is feasible on various plants other than corn. The recovery efficiency on *Egeria densa* was comparable to that of corn, while lower rate was derived on both *Potamogeton maackianus* and *Trapa japonica*, indicating the extraction procedure is not versatile.

- A55: Study on Fractional Recovery of Phosphorus and Heavy Metals from Incinerated Ash and Anaerobically Digested Sludge through Acidic Solubilization

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In this study, acidic solubilization (the pH of about 2 or less with sulfuric acid) of phosphorus and heavy metals and alkaline fractional recovery of those elements were examined, using incinerated ash and anaerobically digested sludge which originated from sewage sludge. The ash showed higher solubilization of phosphorus (72%), while the digested sludge exhibited higher solubilization of heavy metals (87-100%). The recovery of phosphorus from the acidic solutions by a ferric salt and alkali addition revealed that, at the pH of 2-2.3, relatively purified iron phosphate was obtained as precipitates. Also, heavy metals were successfully removed as precipitates at the pH of 8.6-8.8. Higher recovery of phosphorus was possible with the ash. On the other hand, the fractional recovery of phosphorus and heavy metals was easier with the digested sludge, because of its lower element concentrations and chelating ability of heavy metals by soluble organic substances.

- A56: Isolation of salt and nitrate-tolerant biphenyl-degrading bacteria and their biphenyl degradation pathway

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Four biphenyl degrading-bacteria, which have capability of degrading biphenyl in the presence of high concentrations of NaCl or nitrate, were isolated from activated sludge. Among the four isolated strains three strains (SK-1, SK-3, and SK-4) were identified as *Rhodococcus* genus and the other strain (SK-2) was identified as *Aquamicrobium* genus by 16S rRNA gene sequence. The all isolated strains could transform biphenyl to benzoic acid and catechol via 2-hydroxy-6-oxo-6-phenylhexa-2,4-dienoic acid and were able to degrade a broad spectrum of aromatic compounds. Moreover, among the four strains, SK-1 and SK-2, showed degrading capability of high-chlorinated polychlorinated biphenyl (PCB) congeners (from four to six chlorines per biphenyl molecule).

- A57: Transcriptional Repression of PCB/BP catabolite genes by its intermediate metabolite

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Rhodococcus jostii RHA1 is a polychlorinated biphenyls (PCBs) degrader and its PCB degradation genes (bph genes) have been well characterized. It is known that in the presence of biphenyl (BP) the transcription of bph genes is activated by the two-component system, BphS and BphT. In this study, we found that the transcriptional activation by BP is repressed in the presence of benzoate. In RHA1, benzoate is degraded via catechol by benzoate 1,2-dioxygenase (BenABC), 1,2-dihydroxycyclohexa-3,5-diene-1-carboxylate (DHC) dehydrogenase (BenD), catechol 1,2-dioxygenase (CatA), and muconate cycloisomerase (CatB). To investigate the transcriptional repression of bph genes in the presence of benzoate metabolites, single-deletion mutants of benA, benD, catA, and catB were constructed. In the benA- deletion mutant, the promoter activation by BP was less repressed by benzoate than in wild type. The benD- and catA- deletion mutants showed low transcriptional activation in the presence of both BP, and BP and benzoate. The bphAa promoter activity in the catA-deletion mutant was much lower than that in the benD-deletion mutant. The catB-deletion mutant showed nearly the same repression pattern as RHA1. These results suggested that the repression of the BP-mediated transcriptional activation of bphAa is caused by catechol and DHC, which are metabolites of BP.

- A58: Characteristics of crossing distribution and the preference conditions on habitation of *Deiratonotus japonicus*

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This study paid attention to *Deiratonotus japonicus*, and field surveys and laboratory experiments were carried out to make clear the relation between the habitat of *D.japonicus* and aquatic environment in the Kita. Based on these survey and experimental results, influences to habitation of *D.japonicus* by the environmental condition in the Kita were discussed. Major conclusions in this study are as follows: (1)The density of *D.japonicus* decreases in the area over middle water level, (2)*D.japonicus* inhabits the place where mean diameter of riverbed materials is the middle sized gravel, (3)Preference curve on three environment factors (salinity, riverbed materials and water level) is shown by the results of field surveys, (4)Preference of *D.japonicus* is examined by laboratory experiments, the results show that riverbed materials over the middle sized gravel seem to play a role as their hiding place and feeding area.

A59: The effect of Cadmium on disease resistance in *Arabidopsis thaliana* and the examination of its utility as a ecotoxicological assessment

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This study is to examine the efficacy of biomarkers for assessing effect brought by heavy metal stress on the basis of the thing that the elicitation of Systematic Acquired Resistance (SAR) because it is known that SAR of plants is restrained due to expose to environmental stress. The author found that antibacterial activity was inhibited by 1 μ M to 10 μ M cadmium exposure whereas the weight of plant, the rate of germination were not affected at the same concentration. Phytohormones related to SAR were also examined. Abscisic acid (ABA), jasmonic acid (JA) and salicylic acid (SA) are quantified with LC/MS and they decrease cadmium-dose dependently. Especially, the jasmonic acid was very sensitive to cadmium exposure. The author also found the decrease of jasmonic acid and abscisic acid correlated with the area rate of necrosis formed on leaves by a plant pathogen, *Alternaria brassicola*. These results showed that Cd is capable of doing damage to the pathogen resistibility and phytohormones related to SAR could be useful biomarkers of ecotoxicology.

A60: Lead solubility and chemical conversions of lead species in insoluble residues of municipal solid waste incineration fly ash during pH-dependent leaching test

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Chemical composition and chemical conversion of insoluble lead species of municipal solid waste incineration fly ash during pH-dependent leaching tests were investigated using sequential extraction method. Although most of organic lead species were dissolved or converted to other chemical forms after leaching test under any pH conditions, some amount of lead carbonate species and lead oxide species, which seems to be more soluble than organic lead species and residual lead species, were not dissolved. More amount of lead carbonate species was generated after leaching tests. This means that dissolution of lead species in fly ash is very complex phenomena. Although soluble lead species can likely be dissolved easily and hardly-soluble lead species are not dissolved, both soluble and hardly-soluble lead species can be converted to other chemical forms. These chemical conversions can change the leachability of original lead species. The combination of pH-dependent leaching test and sequential extraction method also indicated that the stability of lead-chelate agent complex can be weaker during leaching tests. This imply that immobilized lead by chelating agents can be potentially released to the environment owing to the unstabilization.

A61: Estimation of Children's Internal Exposure to Cesium in Playground Soil

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Fukushima Daiichi nuclear power plant accident released radioactive materials extensively, and there is concern that these materials may have adverse effects on human health and environment. Radioactive cesium strongly adsorbed onto surface soil particles, and therefore, may enter into children's body through soil ingestion and inhalation while children playing in schoolyard. Children's internal exposure doses of cesium via soil were estimated to 0.974 μ Sv/day (2-6 years old) and 0.519 μ Sv/day (7-12 years old), and these values were about 35% (2-6 years old) and 20% (7-12 years old) of dose limit for general public exposure.

A62: Dissociation to Fe²⁺ from Various Ferric Species in River Water

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Iron is one of the essential elements for living organisms. In this study, we focused on the gradual increase of chelate Fe(II) concentration after adding a chelate agent (Ferrozine(FZ)), which binds to Fe²⁺ selectively. Since Fe²⁺ in water bind to FZ promptly, the gradual increase would be due to the equilibrium shifts from other iron species and implies the Fe²⁺ supply potential from other iron species. We investigated the mechanisms of the equilibrium shifts in river water. From the comparison of concentration increase of FZ and FZ/EDTA addition, the increase of Fe(II) complex with FZ was found to be not due to the dissolution of Fe(II) organic chelate complexes, but to the reduction of Fe(III) species. From the long term (~24hours) FZ complexation experiments, the source of the supply of Fe²⁺ was classified into three different Fe(III) species, C1, C2, and C3, by the fitting with the equation of $C=C_0+\sum\{C_i-C_i\exp(-k_i t)\}$ ($i=1\sim 3$) ($k_1>k_2>k_3$, C_0 : original Fe²⁺). In comparison with the dissolution or redox rate constants of known iron species obtained from literatures, C1 was attributed to the free Fe(III) or weak organic complexes, and C2 and C3 to the strong organic complexes.

A63: Effect of ionic strength and pH on ligand exchange reaction between ferric citrate complex and siderophore desferrioxamine B

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Effects of ionic strength and pH on the ligand exchange reaction between ferric citrate complex and siderophore, desferrioxamine B were examined in the rate of ionic strength 0.01–0.7 M and pH 6–9. The observed rate constants were compared with those estimated with theoretically determined conditional stability constants and complexation rate constants. The rate constants of ligand exchange reaction increased as ionic strength decreased and as pH increased, respectively. The observed rate constants were relatively well explained with the estimated values. On the other hand, the initially assumed reaction model failed to describe the effect of pH, with implying the stimulated dissociation of ferric citrate complex by carbonate ion. This study will provide the fundamental knowledge which lead to the description of iron transformation and evaluation of iron availability by algae in coastal waters.

- A64: Distribution characteristics of polycyclic aromatic hydrocarbons with the presense of solid waste and the dissolved organic carbon

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To investigate the effect of organic carbon leached from waste on the behavior of polycyclic aromatic hydrocarbons (PAHs), three different test series (with nothing, with dissolved organic carbon leached from waste, and with waste) were configured. Three kinds of PAH were spiked and recovered by solid phase micro-extraction (SPME) in them. Responses to SPME obtained by two test series were used to determine KDOC. Then, they were also used to analyze results obtained by test in which waste co-exists and finally K_p and K_{oc} were determined. Simple calculation was performed to discuss the influence of high TOC commonly observed at early stage of landfill. Results indicated that most PAHs are the DOC-associated form and it increases total concentration of PAH in liquid by nearly 100 times. However, the contribution of it to the emission of PAHs was less than 50% within initial content.

- A65: Uptake and Removal of Polycyclic Aromatic Hydrocarbons in Roadside Azalea Leaves

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Polycyclic aromatic hydrocarbons (PAHs) in roadside Azalea leaves were analyzed to clarify the contribution of rainfall and re-volatilization events to disappearance of PAHs from the leaves. The results of PAHs concentrations in the leaves and the atmosphere implied that PAHs in the air and leaves are in equilibrium. Sequential extraction to separate PAHs into three components (water-extracted, dichloromethane-extracted, and inner tissue) revealed that not only gaseous PAHs but also particulate PAHs can penetrate into the inner tissue. Although phenanthrene showed 7% removal by rain, it was concluded that PAHs removal by rainfall events was not significant. Flesh air was exposed to the collected leaves, and the re-volatilization rate was also investigated. The estimated re-volatilization kinetic constant was similar to the values reported for other plants.

- A66: Sewerage Works Management and Burden Sharing among Districts and Generations in the Transition Process to Population Decreased Society

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The management of sewerage works whose system should be reconsidered when its lifetime is over due to significant population decrease was examined. In order to smoothly transit to the new system adapted to population decreased situation, sustainable softlanding management was proposed. It means that the finance of present sewerage works is completed in its lifetime. The financial burden sharing among districts under sewerage system developing and generations was examined under the proposed management system. The burden difference among districts due to the difference of sewerage system developed time was evaluated and measures to narrow it by public works services was suggested. The difficulty to narrow the burden difference among generations was pointed out.

A67: GIS SUPPORTED RISK ASSESSMENT OF WATER SUPPLY FOR DISTRIBUTION NETWORK

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This study proposes a method to evaluate risks of water supply shortage in case of pipeline accidents, using GIS (Geographic Information System) from the graph structure of relevant consumer units which are defined as an area of water distribution network enclosed by isolation valves. This study shows a method to quantify the risks of water supply shortage for the each consumer unit, such as total impact on the whole network by the accident in a unit, and separated impact on each consumer units. With this approach, we can visually clarify the relationship among the consumer units in view of the risks of water supply shortage. Finally, case study illustrates the evaluation for this approach applying to a model area and shows a new perspective for a basis of future rehabilitation planning.

A69: An economic evaluation of the resident load for the separated discharge of household organic garbage

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Recycling treatment of the household organic garbage is very important issue to establish a recycling-oriented society, but it needs to classify the garbage by resident before discharge. The separated discharge of household organic garbage may be a big load to the resident, because it takes time and needs some special processing and operation. To design a reasonable and acceptable system, it is necessary to evaluate the separation and collection system from an economic and engineering point of view.

In this article, resident's cooperation intention was investigated based on a case study in Ise city. The calculation of the economic value of the residents load was tried to examine a more reasonable waste management method by two questionnaire surveys. According to the survey made to residents in Ise city, it seems to be possible to calculate the residents load using a contingent valuation method, and as a result, it became clear that the evaluated resident's load for the separated discharge in this area is very limited.

A70: Categorization and Characteristics Analysis of Household Pro-environmental Behaviors

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To build-up effective measures for fostering citizens' pro-environmental behaviors, the current citizen's state should be comprehended on a nationwide scale. In this study, we extracted 44 everyday-behaviors and 13 machinery-introductions and a questionnaire to ask practice degrees, the reasons and perceived effectiveness was conducted in all of Japan. We got 37,449 valid responses. From this data, we performed hierarchical cluster analysis each by practice degrees and the perceived effectiveness and found 12 clusters. We also conduct chi-square test for checking the differences in five demographics of respondents; generation, sex, educational background, a house form, and yearly income. As a result, older, woman, higher education background, owner-occupied housing, and higher income are characters for high practice rate. The results showed different characteristics of each categories, so we should not take same nor different approaches in every behaviors, but different in each categories. The characteristics of categories help make more effective approaches.

A71: Evaluation of the treatment performance of multi stage vertical flow constructed wetlands for livestock farming effluent

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Although the constructed wetland has been highlighted as a small scale distributed treatment technology, reports about its start-up performance including winter are few. In the present study, a full-scale experimental study was conducted on a 5-stage subsurface vertical flow constructed wetland treating livestock farming effluent and the start-up water purification performance during 8 month operation including winter was evaluated. It was found that the constructed wetland had high treatment potential even at start-up year including winter. There was positive correlation between influent pollutant load and removed load per unit wetland area. However, pollutant removal efficiency dropped to lower values although influent pollutant concentration and water load did not increase. For this reason, it was suggested that water purification processes varied in the winter season.

A72: Characteristics of the restaurant wastewater and oil removal in the grease trap

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The characteristics of an oil containing wastewater from a restaurant in the university were examined. The concentration of oil was highest when the flow rate was highest in lunch time. The pH value and temperature were high since a dish washing machine was used. The trapped solid in the strainer and floated oil on the grease trap were collected once a day, and the dried weight and oil contents were measured. The collection ratios of oil and solid in the grease trap were 4-15% and 10-37%, respectively. Questionnaire survey was carried out for the restaurants in Kanazawa and Komatsu cities. Discharges of wastewater in some of the restaurants were higher than those in the standard value described in the manual for the design of the grease trap. Ratio of the restaurants using the dish washing machine was 62.5%, and wastewater discharge tended to increase by the washing machine. Since HRT in the grease trap was short (0.02-40.7min) as well as the restaurant in the university. The maintenance of grease trap was not suitable and several problems such as bad smell and sludge deposition occurred in most of the restaurants. Since the addition of several chemicals and aeration in the grease trap began to spread, it is needed to confirm the effects.

A73: Quantification of Viable Escherichia coli in Water Environment by Real-time PCR with Propidium Monoazide

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A combination of PMA (propidium monoazide) and real-time PCR was developed to enumerate viable Escherichia coli in the presence of dead cells. Mixtures of viable cells and heat-treated cells were subjected to real-time PCR with PMA treatment. Condition of 50 μ M PMA and a 5-min light exposure excluded DNA from heat-treated cells. Viable cell counts were linearly related to real-time PCR threshold cycle values for PMA-treated cells in the mixtures of viable and heat-treated cells, as long as the ratio of dead cells to viable cells was no greater than 1×10^1 . In the wastewater treatment plants, total, viable and culturable E.coli were enumerated by real-time PCR, real-time PCR coupled with PMA treatment and MPN method using EC-MUG medium, respectively. The concentrations of viable E.coli cells in the wastewater treatment plants were much higher than those of culturable cells. In addition, they were even more chlorine resistant than culturable cells.

A74: Performance characterization of a novel bio-desulfurization process aerated by biogas circulation

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To stimulate gas-liquid mass transfer of H₂S, a novel bio-desulfurization process aerated by biogas circulation was developed. The performance of the process was characterized in continuous experiments using biogas produced from an anaerobic digester. A strong positive correlation between biogas circulation rate and desulfurization rate was observed, and the process achieved 93% H₂S removal

efficiency on average with the biogas circulation rate, which was 6 times larger than the biogas inlet flow rate during the operation at 500 L/L-culture/d biogas loading rate. In addition, the results of the experiments with different conditions indicates a positive correlation between oxidation-reduction potential (ORP) in the reactor and the SO₄²⁻ conversion ratio, which is likely related to the gas-liquid mass transfer of O₂ stimulated by increase in biogas circulation rate and air addition rate. The comparison between the results of continuous experiments and batch experiments suggest the gas-liquid mass transfer rate of H₂S was the rate-limiting step in the process with the presence of sufficient O₂, and further increase in the mass transfer efficiency of H₂S is needed to enhance desulfurization

A75: Environmental factors for enhancing biological decolorization of recalcitrant textile wastewater and dyes

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A numerous kinds of synthetic organic colorants are currently used for the dyeing of various materials such as textiles, food, cosmetics, and printing. Such colorants are also released into the water environment from industries and daily use. Most colorants are hardly biodegradable in the environment, and therefore cause environmental pollutions. The goal of this study is to develop more cost effective technologies to decolorize and degrade the colorants in the environments and industrial wastewater with microorganisms. In this study, we successfully decolorized colored textile wastewater, azo dye and anthraquinone dye. The environmental factors affecting the decolorization were dissolved oxygen concentration and acetate supplementation. However, these effects were completely different in the two dyes. The environmental conditions effective for decolorizing textile wastewater were similar to those for the azo dye, suggesting that causative agent of color of the textile wastewater was azo dye. Since the degradation rate of organic matter in the wastewater was correlated with the decolorization rate, it was expected that the decolorization of wastewater and the degradation of organic matters proceeded simultaneously. The results suggested a large contribution of decolorization reaction to the organic matter degradation.

A76: Development of a novel high rate wastewater treatment system for small scale traditional Sanuki-udon industry by combining of two-phase anaerobic DHS and UASB reactor

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We developed a novel wastewater treatment system combining two types of anaerobic bioreactors for treating discharge volumes of up to 100 L·d⁻¹ of high strength SS containing food industrial wastewater. An anaerobic down-flow hanging sponge reactor with effluent recirculation (An-DHS) was coupled with an UASB reactor. The An-DHS unit works anaerobic trickling filter, employing polyurethane sponges as support material for the growth of anaerobic microorganisms. In our novel treatment system, the An-DHS reactor pretreated the wastewater for the UASB reactor, removing SS from the wastewater and producing VFAs by acidification. We conducted a continuous flow experiment for over 700 days using a raw wastewater, mainly starch from flour, obtained from a Sanuki-udon restaurant. The reactors achieved HRT of 10.6 hrs in the An-DHS and 4.4 hrs in the UASB reactor (15.0 hrs total) and average OLR of 10 kgCODCr·m⁻³·d⁻¹ in the An-DHS and 12 kgCODCr·m⁻³·d⁻¹ in the UASB reactor. Compared to the feed wastewater, the system removed about 80% SS concentration and increased the VFA proportion (Total VFA COD concentration / CODCr soluble concentration) by approximately 54% using the An-DHS.

- A77: Factors regulating a novel high-loading oxidation ditch system with dual dissolved oxygen(DO) control technology for flexibility under influent load fluctuation

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The authors have developed a high-loading oxidation ditch (OD) system with dual dissolved oxygen (DO) control, which is used to maintain a constant aerobic/anoxic zone ratio under fluctuation of influent load by controlling the aeration and internal circulation rates independently. In this study, the flexibility and the regulating factors of this technology under influent load fluctuation were investigated using the bench-scale experiment results and a mathematical model. From a result of this study, the advantage of dual DO control is clear with regard to the zone operation of OD when compared to other control methods such as the single (conventional) DO control method and the constant air flow-rate method. When the dual DO control maintained a stable DO value at the end of the aerobic zone, a constant aerobic/anoxic zone ratio was achieved. Moreover, the applicability to the wide range of influent load, which was achieved by controlling the DO set value at upstream, was suggested even in the full-scale plant at which the range of the circulation velocity was restricted.

- A78: Degradation Characteristics of Perfluorocompounds by Radiation of Ultra Violet Lamp

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Degradation of PFOA and PFOS in water by UV radiation was experimentally discussed. 0.00132 mM of PFOA was degraded per added 1mM K₂S₂O₈ during 6 hours of UV irradiation with wave length of 254 nm at 1.76 mW/cm³ of water. PFOA was degraded through the shorter chain of PFCAs such as PFHpA, PFHxA, PFPeA and PFBA, and mineralized. SO₄²⁻ generation rate was almost proportional to K₂S₂O₈ concentration, and the value of the proportional constant was 0.51 μmol/mM/s. This suggests that the UV utilization efficiency can be increased if K₂S₂O₈ concentration is increased. SO₄²⁻ generation rate was also proportional to F⁻ generation rate, and it was suggested that 0.0044mol of F atom was released per 1 mol of sulfate radical. And more than 90% of 0.024 mM PFOA was also degraded during 6 hours UV irradiation with wave length of 185 nm at 0.176 mW/cm³ of water. In this degradation process, the other degradation path way was also suggested in addition to the path way through shorter chain PFCAs. PFOA and PFOS were reductively degraded by 60 % and 35 %, respectively, under existence of 0.3 mM KI during 12 hours UV irradiation with wave length of 245 nm at 1.76 mW/cm³ of water. PFOS was degraded and mineralized by defluorodization reaction with eq- through PFOA.

A79: Generation of O₃ and OH radicals by A 3-Dimensional Electrolytic Reactor

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Advanced oxidation processes (AOPs) that generate hydroxyl radicals and decompose persistent toxic substances in water and wastewater have received much attention over the last two decades. In this study, we proposed a new electrolytic reactor for generating O₃ and OH radicals with an application of electric current. The reactor consists of SnO₂ anode and granular electrodes for the generation of O₃ and OH radicals, respectively. From experiments in O₃ generation, it was found that very stable O₃ formation was achieved in continuous experiments. On the other hand, from experiments in reducing dissolved O₃ by granular cathodes, it was found that OH radical was formed and analyzed concentrations of OH radical were much larger than those in former study. This large enhancement was considered attributable to large surface area of 3-dimensional electrolytic reactor. From these results, we concluded that the present electrochemical reactor is useful for enhanced wastewater treatment with very simple operation.

A80: Hydraulic Optimization of Outlet-Structure in Low Depth Rectangular Dissolved Air Flotation Tank using CFD

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Computational Fluid Dynamics (CFD) was applied to optimize a outlet position and structure of a low-depth rectangular dissolved air flotation tank. According to the hydraulic characteristic analyses for residence time distribution (RTD) curves, the parameter, θ_{10} (dimensionless time at which 10% of tracer has discharged) increased from 0.14 to 0.37 by moving a outlet pipe from the far side to the near side of inlet position, suggesting significant reduction in short circuiting flow. An outlet pipe near inlet position also showed the better removal efficiency by reducing the bubble contents in the effluent. A covering of outlet pipe to take the effluent from the bottom of flotation tank improved hydraulic performance slightly. The video camera observation of an actual flotation tank optimized by the CFD simulation showed the far side bottom of inlet position seemed a recirculating region but near side bottom seemed calm region same as the CFD simulation. The effluent from the near side bottom in the flotation tank resulted in good SS removal efficiency.

A81: ADSORPTION CAPACITY OF BACTERIOPHAGE Q β ONTO ACTIVATED CARBONS

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Activated carbon (AC) adsorption is commonly applied in drinking water treatment to deal with natural organic matter and micropollutants. Based on the pore distribution of ACs, viruses present in drinking water sources can probably be admitted into pores of ACs. This research was performed to examine the adsorption capacity of viruses onto ACs in the presence of organic matters. Adsorption isotherms of bacteriophage Q β , as a model virus, in coexistence with organic matters were analyzed to evaluate the impacts of pore size distribution of ACs and the likely impacts of organic matters. Single solute and simultaneous adsorption experiments with organic matters contained in a peat water and a wastewater after biodegradation were performed for four coal-based ACs having different pore distributions. The observed isotherm data indicated that the presence of organic matters adversely affected the uptake for bacteriophage Q β . The competition for the adsorption site might cause the adsorption capacity reduction in the presence of organic matters. ACs with different pore size distributions revealed different adsorption capacity for bacteriophage Q β .

A83: The preservation method for trace mercury in precipitation on alpine areas and the long-range transportation of mercury along with calcium and sulfate

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The concentration of mercury in the precipitation decreases during sampling and preservation due to adherence to the bottle wall. To prevent the loss of mercury from the precipitation, addition of L-cysteine which is not so dangerous as BrCl solution, was found to be effective especially when it is applied to the sampling on the alpine areas. The concentration of mercury in the precipitation was measured by using this technique in Imizu City, Toyama. The mean concentration of mercury was 6.5ng/L. The mercury concentration in the snowfall was measured Tateyama alpine area with an altitude of 2450m as well. High concentration was found not only for mercury but also for calcium and sulfate in the Kosa Layers, indicating that they were transported simultaneously from the continent. The size distribution analysis for Kosa particles also showed that mercury could be simultaneous transported with calcium and sulfate.

A84: Polycyclic Aromatic Hydrocarbons and Organophosphoric Triesters in Air and Atmospheric Deposition

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This paper reports on five polycyclic aromatic hydrocarbons (PAHs) and seven organophosphoric triesters in the atmosphere of Kinki University campus of Higashiosaka, Japan. All of the PAHs and OPEs were detected in the air and atmospheric deposition. PAH and OPE concentrations in the air ranged from 0.012 to 7.8 ng/m³ and from 0.058 to 69 ng/m³. PAH and OPE surface loadings for non-rainfall time were 5.1–71 ng/m²/d and 2.1–570 ng/m²/d, respectively. The PAHs were mainly contained in the coarse particulate matter; particle diameter >1.0 μm. The OPEs were mainly contained in the fine particulate matter; particle diameter <1.0 μm or gas phase. The surface loadings for rainfall time represented around 5–100 times higher than them for non-rainfall time. The trends of PAH and OPE pattern in wet deposition were similar in the case of dry deposition. The relationship between the water solubilities and the total concentrations in a rain water and a fine particulate matter for PAHs and OPEs was investigated. The concentrations tend to increase with the water solubilities. This trend may indicate that hydrophilic chemicals dissolve in a rain water during fall to the ground.

A85: NOCTURNAL DRAINAGES IN THE NORTHERN OSAKA PLAIN, THEIR OCCURRENCE CONDITIONS AND RELATIONSHIPS WITH HEAT-ISLAND PHENOMENA

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The Osaka Plain faces with the Hokusetsu Mountains on the north. It is supposed that nocturnal drainages break out on the south-facing slope of the mountains and flows into the north part of the plain. Purposes of the present study are to clarify their occurrence conditions and to examine their relationship with nocturnal heat-island phenomena by analyzing such observational data as the AMeDAS data. After classifying daily time series of wind direction of the AMeDAS Toyonaka into typical daily fluctuation patterns, the non-linear discriminant analysis was carried out with the typical daily pattern as a dependent variable and geostrophic wind vector and daily solar radiation as independent variables. The occurrence conditions were clarified by examining distributions of the independent variables of each pattern. And the relationship was investigated by temperature differences between the north part and the center part of the plain and daily lowest temperature of the center part of each pattern.

A86: Applicability of the Meteorological Scenario Days for Risk Analyses of Atmospheric Environments and Their Usage as Target Scenarios

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We proposed in the preceding paper a new method to select meteorological scenario days representing a variety of daily meteorological conditions which occur in estimation periods for risk analyses of atmospheric environments. Purposes of the present study are to demonstrate an applicability of the method and to examine a usage of the scenario days. In the present study, the meteorological scenario days were selected by using typical daily fluctuation patterns detected in wind direction time-series of the AMeDAS Kobe. The applicability was verified by that ensemble means or ensemble relative frequency distributions both of meteorological elements and of air pollutant concentrations observed in the scenario days agreed well with true means or true frequency distributions of risk estimation periods. By comparing ensemble relative frequency distributions of pollutant concentrations of each scenario, scenario days which can cause some environmental damages were selected as target scenarios.

A87: Emission of volatile and semi-volatile organic compounds during compression experiment of plastic wastes

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Emission of volatile and semi-volatile organic compounds was studied in the compression experiment of plastic fractions from municipal solid waste. Compression experiment was conducted at five operating conditions, changing compression pressure, the number of compression times and gaseous atmosphere. 28 volatile and semi-volatile organic compounds in the emission gas phase were quantitatively determined and their emission intensity was calculated. The total amount of the determined compounds ranged at 18–135 $\mu\text{g}/\text{kg}$ waste throughout the compression experiment runs, and BTX (styrene, toluene, ethylbenzene, xylene and benzene) occupied 60–90%wt of the total determined. Based on the experimental result, emission concentrations of the compounds from actual plastic recycling facilities were tentatively estimated assuming their plastic recycling activities and gas emission rates. The calculated concentrations of the target compounds, for which environmental air quality standards and guideline values for environmental and indoor air have been set, were all far below the level of concern.

A88: WATER RETENTION DYNAMICS IN SIMULATED LANDFILL UNDER SETTLEMENT

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To examine how water retention dynamics in a landfill environment change as a result of solid waste settlement and to derive the evolution of pore size distribution, lab scale long column experiment was carried out at two different times while keeping all the other characteristics are constant. Two columns, Column 1 and Column 2, were used in the study. The log normal distribution model was applied to model the experiment data. Column 1 was used to obtain the water retention curve at time 0 day and Column 2 at time 180 day. During the experiment period, landfill settlement was mainly in the primary settlement stage. The results have shown the variation of the water retention characteristics under settlement and emphasized that these changes have to be considered in unsaturated leachate flow modeling. Pore size distribution was obtained by assuming that the capillary theory is applicable in landfill environment. However, water retention and pore size distribution must be explained by considering absorptive properties of waste particles, level of compaction and age of the waste

A89: Applicability of Bamboo Charcoal with Multifunctional Characteristics to Geomaterial

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The purpose of this study is to show applicability of bamboo charcoal with multifunctional characteristics to Geo-material from the viewpoint of both environmental restoration techniques and recycle of construction generated soil. Firstly, triaxial compression tests were performed on samples of granulated bamboo charcoal particle mixed with clay. Internal friction angle of the composite material was almost equal to that of sand. Secondly, unconfined compression tests were carried out to investigate the effect of bamboo charcoal mixture on soil stabilization of volcanic cohesive soil. The unconfined compression strength of stabilized soils mixed with bamboo charcoal was increased remarkably. In addition, hexavalent chromium leaching amounts of stabilized soils mixed with bamboo charcoal were dependent on the carbonized temperature of bamboo charcoal. Finally, the improvement effect of mixed-clay between contaminated clay and granulated bamboo charcoal material were investigated from a point of view of sulfate reduction. The clay improvement effects were observed depending on mixing rate of bamboo charcoal material. Based on these tests, it was shown that the bamboo charcoal had multiple uses for geomaterial.