

Characteristics of Ecotoxicity in Industrial Effluent using *DaphniaMagna*

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Introduction

It is difficult to manage the industrial waste water in an environment-friendly way only through the existing management substances such as general water quality items, heavy metals, and some hazardous substances. Since various pollutants scattered in the water system are capable of causing reciprocal reactions, it is difficult to evaluate the hazard of an ecosystem only through the existing physico-chemistry water quality evaluation. This study conducted an analysis of physico-chemistry water quality and ecotoxicity on industrial waste water in Busan by using *Daphnia magna* and examined the causes of ecological toxicity and the reduction methods.

Polycyclic Aromatic Hydrocarbons(PAHs) in river and sediment around water treatment facilities, Korea

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Abstract

Polycyclic aromatic hydrocarbons (PAHs) were determined in water and sediment around water treatment facilities in Korea (STP, WTP, VTP). The removal efficiency of total PAHs from most of the influent samples was more than 90% in effluent. The total PAH concentrations of the river around the water treatment plant ranged from 0.05 to 0.93 $\mu\text{g/L}$. The total PAHs concentrations of sediment ranged from 21.06 to 579.48 ng/g dry weight. Most of the sediment samples with FluA:pyr<1 and PhA/AnT<1 were characteristic of a mixed pattern of pyrolytic and petrogenic input. These results indicate that the contamination of PAHs comes from various sources around water treatment facilities

Key words : PAHs, watertreatmentfacility, influent, effluent, removalefficiency, river, sediment

A Study on Mineral Characteristics of Drinking Water in Busan

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Abstract

This study was carried out to evaluate mineral characteristics of ground water(301 sites), spring water(180 sites) and bottled drinking water(27 brands) in the Busan area from 2009 to 2011. The total concentrations of the four items analyzed are groundwater (82.725mg/L), bottled water (28.704 mg/L), and spring water (21.021 mg/L). Correlation coefficients between Mg and Ca of spring water, bottled water and ground water were 0.776, 0.772 and 0.555 ($p < 0.01$) respectively, showing the highest correlation. 126 (24.8%) out of 508 drinking waters were investigated as drinking water with K index ≥ 5.2 that Hashimoto defines as healthy water.

Water quality and biological characteristics of maintenance water discharged streams

Abstract

This study assesses the water quality and biological (benthic macroinvertebrates) communities in various maintenance water supply systems. After the maintenance water was supplied in 2005, the BOD of the Oncheon Stream decreased and the water quality fluctuations were greatly reduced. After the maintenance water was supplied in the Suyeong River in 2008, the average BOD was also decreased. Before the discharge of sea water in Dong Stream, the COD value fluctuated severely. However, after the discharge in 2010, it showed an annual stable value of approximately 5 mg/L. In Oncheon Stream after the discharge of maintenance water from the Nakdong River, the numbers of species and individuals and the diversity index gradually increased, and the dominance index is slightly decreasing year by year.

Dynamics of phytoplankton and water quality in the Seonakdong River

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Keywords: Seonakdong River; Phytoplankton; Water quality determinants

Introduction

The SeoNakdong River is the main branch of the Nakdong River, and it has become a reservoir-shaped river since the gates were built at Daejeo in the upper stream and Noksan in the down stream in the 1930s to secure agricultural water supply. Water quality in the dry season is degraded because of low self-purification, eutrophication of semi-closed stagnant water body and water bloom of phytoplankton. Many studies have been conducted on the management strategies of pollution sources in the Seonakdong River watershed(Hwang, 2008; Kim et al., 2002) and variation and distribution of phytoplankton groups in the lower Nakdong River(Lee et al.,2005). However, few continuous studies were conducted on the water environment in the Seonakdong River, making it difficult for decision-making on ecological management strategies. This study reports on the result of an 8-year investigation on the seasonal variations of phytoplankton and physiochemical water quality determinants in the Seonakdong River.

한국환경과학회지 제21권(제9호), 1069~1078, 2012

석면함유 건축물의 석면 노출 및 위해성 평가

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Asbestos Exposure and Health Risk Assessment in Asbestos-Containing Buildings

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Abstract

This study was performed to evaluate the asbestos exposure levels and to calculate excess lifetime cancer risks(ELCRs) in asbestos-containing buildings for maintenance and management. The range of airborne asbestos concentration of 33 buildings was 0.0018 ~ 0.0126 f/cc and one site exceeded indoor air-quality recommended limit 0.01 f/cc. And ELCRs based on US EPA IRIS(Integrated risk information system) model are 1.5E-06 ~ 3.9E-05 levels, and there was no site showed 1.0E-04 (one person per million) level or more, and 11 sites showed 1.0E-05 (one person per 100,000 people) level or more. To prevent the release of asbestos fibers, it needs operation and maintenance of asbestos-containing building materials, and there are some methods such as removal, repairment, enclosure and encapsulation. In conclusion, a risk-based air action level for asbestos in air is an appropriate metric for asbestos-containing building management.

Key Words : Asbestos, Health risk assessment, Excess lifetime cancer risks(ELCRs)

한국환경과학회지 제21권(제8호), 953~963, 2012

부산지역 도시 열섬의 변화경향 분석 (2006-2010)

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(2012년 4월 20일 접수; 2012년 5월 21일 수정; 2012년 6월 20일 채택)

An Analysis on the Variation Trend of Urban Heat Island in Busan Area (2006-2010)

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Abstract

The annual variations of the urban heat island in Busan is investigated using surface temperature data measured at 3 automatic weather stations(AWSs) for the 5 years period, 2006 to 2010. Similar to previous studies, the intensity of the urban heat island is calculated using the temperature difference between downtown(Busanjin, Dongnae) and suburb(Gijang). The maximum hourly mean urban heat island are 1.4℃ at Busanjin site, 2300LST and 1.6 ℃ at Dongnae site, 2100LST. It occurs more often at Dongnae than Busanjin. Also the maximum hourly mean urban heat island appears in November at both sites. The urban heat island in Busan is stronger in the nighttime than in the daytime and decreases with increasing wind speed, but it is least developed in summer. Also it partly causes the increasement of nighttime PM10 concentration.

Key Words : Urban heat island, Annual variation, Intensity

한국환경과학회지 제21권(제8호), 939~951, 2012

부산지역 도심하천 복원에 따른 기온변화 효과 분석

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(2012년 4월 20일 접수; 2012년 5월 24일 수정; 2012년 7월 20일 채택)

An Analysis of the Temperature Change Effects of Restoring Urban Streams in Busan Area

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Abstract

This study is conducted to estimate the air temperature decreasing effects by restoring urban streams using WRF/CALMET coupled system. The types of land use on covered streams are constructed with the land cover map from Korea ministry of environment. Restoring covered streams changes the types of land use on covered areas to water. Two different types of land use(CASE 1 and CASE 2) are inputted to the WRF/CALMET coupled system in order to calculate the temperature difference. The results of the WRF/CALMET coupled system are similar to the observed values at automatic weather stations(AWS) in Busan area. Restoring covered streams causes temperature to be decreased by about 0.34~2℃ according to the locations of streams and the regions that temperature is reduced are widely distributed over the restored area. Reduction of temperature is increased rapidly from morning and maximus at 13LST. Natural restoration of streams will reduce the built-up area within urban. With this, temperature reductions which are the cause to weaken the urban heat island appear. Relief of urban heat island will help to improve the air quality such as accumulation of air pollutants in within urban area.

Key Words : WRF, CALMET, Land use, Temperature, Restored urban stream

The 53rd Annual Meeting and International Symposium of Korean Society of Life Science

The Investigation on Density of *Culex tritaeniorhynchus* in Busan 2011

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This study was carried out to investigate the time of appearance and the density of *Culex tritaeniorhynchus* in Busan region. Through the accurate classification of mosquito species, we help to announce the japanese encephalitis advising and warning and accumulate the basic data for mosquito pest control. Mosquitoes begin to appear in April, increase in August highly and decrease gradually by November. Total of 13,036 objects were classified into 7 species of mosquitoes, *Anopheles sinensis* (49.2%), *Aedes vexans nipponii* (23.4%), *Culex tritaeniorhynchus* (22.0%), *Culex pipiens pallens* (2.7%), *Ochlerotatus togoi* (1.9%), *Armigeres subalbatus* (0.5%), and *Culex inatomii* (0.1%), *Culex tritaeniorhynchus* is the agent causing japanese encephalitis. *Culex tritaeniorhynchus* was appeared in April at first, increase in August (1316.5) highly because of high temperature, and decrease in September gradually in Busan region. The whole number of mosquitoes reduced in 2011, comparing to aerge year (2006~2010) because of rain and temperature.

Key words : Busan, Mosquito, Japanese Encephalitis

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Analysis of Volatile Compounds in Flowers of *Camellia* in Jeju Island and Japan

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The purpose of this study was to identify the volatile compounds of *Camellia japonica* L. in Jeju Island and *Camellia* cv. *Tamaikari* in Japan. Volatile compounds were obtained by headspace method and analyzed using GC-MS. 1,8-Cineol, benzoic acid and benzaldehyde were identified as main volatile compounds of Jeju *Camellia* flowers. On the other hand, the major constituents of *Camellia* cv. *Tamaikari* were linalool, methyl salicylate and cis-linalool-3,6-oxide. 1,8-Cineol having fresh camphoraceous odor and benzaldehyde having sweet almond-like odor characterize spicy floral fragrance of *Camellia japonica* L. in Jeju island.

Key words : *Camellia japonica* L., *Camellia* cv. *Tamaikari*, Volatile compounds, GC-MS

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Genetic Characteristics of Enteric Virus in Busan

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This study was carried out to investigate the epidemiological characteristics of the enteric virus that causing gastroenteritis in Busan. Total of 1,931 specimens were collected from feces and examined from January to December in 2011 and detected 475 (24.6%) cases of enteric virus. Among 475 positive samples, 216 cases were confirmed as rotavirus (11.2%), 141 cases as norovirus (10.1%), 82 cases as enteric adenovirus (4.3%), 34 cases as astrovirus (1.8%), and 2 cases as sapovirus (0.1%) respectively. We classified by months, enteric virus is detected more frequently from December to April (79.6%). Many genotypes of norovirus have been reported with high genetic diversity. To obtain the molecular epidemiological information on norovirus sporadic cases in Busan, we analyzed the nucleotide sequences of the strains detected. Norovirus was analysed into 3 (GI.2, GI.3, GI.9) of genogroup I and 6 (GII.1, GII.2, GII.3, GII.4, GII.6, GII.8) of genogroup II. Prevalent genogroup of norovirus was group GII and genotype was GII.4 in Busan, 2011. The results of this study contribute to accumulate the currently available epidemiological data and improve public health and hygiene via development of diagnostic methods and sustainable surveillance.

Key words : Busan, enteric virus, gastroenteritis

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Proceedings for HIV Confirmatory Test during Recent 3 Years in Busan

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In Korea, HIV confirmatory test is carried out by National Institute of Health and Public Health and Environment Research Institute by law. Our laboratory commits HIV confirmatory test for the reactive serum or plasma by HIV screening test in Busan. These reactive specimens are collected from the HIV screening agency such as civic local health center, local clinics, university hospitals, military manpower administration, and blood center of Korea Red Cross. The algorithm for our laboratory to accomplish HIV confirmatory test includes ELISA (*Vironostika*[®] *HIV Uni-Form II plus O*), particle agglutination test (*PA test, Serodia*[®] *HIV-1/2*), P24 antigen test (*VIDAS*[®] *HIV P24 II Antigen*), western blot (*MP diagnostics*[®] *HIV Blot 2.2*). This study intends for checking the results of HIV confirmatory test during recent 3 years in Busan. A total of 3,162 specimens were examined and 2,647 (83.7%) specimens were turned out to be negative using with our ELISA and PA protocols. The remaining 515 (16.3%) specimens were assayed with anti-HIV western blot and 109 (21.2%) were confirmed to be negative, 327 (63.5%) to be positive, 79 (15.3%) to be indeterminate. Among the indeterminate case, it is needed to review the follow-up results retrospectively, so we will analyze indeterminate case in next time.

Key words : HIV confirmatory test, ELISA, PA, western blot

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Distribution Characteristics of Dioxins in Marine Sediment from Busan Port in Korea

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Eight marine sediments from Busan port in Korea were annually analyzed to examine the concentration distribution of dioxins from 2006 to 2010. Yearly mean concentration of dioxins ranged from 186.3 to 383.3 pg g⁻¹ in real values and 5.087 to 8.541 pg-TEQ (Toxicity equivalency) based on dry weight of samples. The dioxin concentration at the site near fishing market was the highest concentration among all sampling sites. Also the dioxin concentration at the sites with various pollutant sources such as large ships, sewage influx and thermal power station as well as fishing market was higher than that of the sites without specific pollutant sources. Another main factor that affects the dioxin concentration is topography characteristics of the bay. The bay has relatively high dioxin concentration because of the lack of the pollutant diffusion. This study demonstrated that the dioxin concentration in the site with pollutant sources and the lack of the pollutant diffusion was relatively high as compared with the other sites. As a result of contribution ratio of dioxin congeners, OCDD (Octachlorodibenzodioxin) in all sites was major contributor in real value, in contrast, dioxin congeners in TEQ values were dominated by 2,3,4,7,8-PeCDF.

Key words : Sediment, Dioxin, Distribution, Contribution rate

Distribution of u-POPs in Exhaust Gas and Ash from Incinerator

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Abstract

To study the distribution characteristics of unintentional persistent organic pollutant(u-POPs) in exhaust gas, bottom ash and fly ash from incinerator, five municipal waste incinerator were investigated. The results were as follows. Dioxins concentration from exhaust gas except A incinerator were slightly detected with the range from 0.000 to 0.005 ng TEQ/Sm³. this concentration was a meager level compared to the effluent quality standard with 0.1 ng-TEQ/Sm³. The concentrations of co-planar PCBs and hexachlorobenzene were in the range of 0.000 ~ 0.003 ng-TEQ/Sm³ and 0.000 ~ 15.146 ng/Sm³, respectively. In the case of bottom ash, the dioxin concentration except A incinerator was generally low level. And co-planar PCBs concentration was low level compared to the dioxin concentration. HCB concentration was detected in the range of 0~8.5 ng/g at all incinerators. All investigated items were more detected in fly ash than in bottom ash. Especially, these items in B incinerator were higher detected than in the other incinerator. So it was needed to make its best effort at the incinerator operating the electric precipitator to reduce the u-POPs concentration.

Key words : uPOPs, exhaust gas, bottom ash, fly ash

EVALUATION OF DIOXIN CONTAMINATION IN SEDIMENT FROM BUSAN PORT, THE REPUBLIC OF KOREA USING PRINCIPAL COMPONENT ANALYSIS

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Introduction

Busan metropolitan city, the second largest city in Korea is located on southeastern tip of Korean peninsula and faced with the East Sea. Busan port, the world's 5th busiest container port and the largest transshipment port in Northeast Asia, handled more than 16million TEU (twenty foot equivalent units) in 2011. It is estimated that there are many pollutants from ships in Busan port. Also the pollutants that flow in the river and the sewer pipe, were accumulated inside the Busan port because of the topography characteristics of the bay. Especially, dioxins with hydrophobic properties tend to accumulate in sediments that are the final reservoir of pollutants¹⁾. Because of the higher density and low water solubility of dioxins, dioxins released from sources tend to adsorb and accumulate in soil or sediments. Dioxins released in the atmosphere return to the soil, plants or organisms by dry and wet deposition process and finally accumulate to human beings through food chains²⁾. It is assumed that soils and sediments are the largest reservoir media of dioxins. Especially, marine sediments are main route for marine life to adsorb dioxins. The monitoring of dioxins in marine sediments from the Korean coast including Busan port has been regularly undertaken on a national scale by the ministry of land, transport and maritime affairs¹⁾. Because this monitoring can't represent the characteristics of Busan port, we are monitoring the marine sediments from Busan port divided into eight sites. This study focused on spatial distribution of dioxins in sediments and the evaluation of dioxin contamination characteristics in sediments from Busan port in South Korea using principal component analysis.

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Isolated Respiratory Virus and Clinical Features Analysis of Acute Respiratory Illness in Busan

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Acute respiratory illness (ARI) is the most frequent infectious disease of humans. They result in major economic impact through loss of productivity and strain on healthcare systems. This study aimed to define the causative viruses and clinical features of ARI to in Busan from January 2008 to June 2011. A total of 2,631 ARI were analyzed. Nasopharyngeal aspirate and throat swab was obtained for virus detection. Rhinovirus (RV), adenovirus(ADV), respiratory syncytial virus (RSV), coronavirus (CoV), enterovirus (EV), bocavirus (BoV) and parainfluenza virus (PIV) were identified using PCR. Viral agents were isolated in 31.9% (840 cases). The common identified pathogens were RV (13.2%), ADV (9.6%), RSV (2.4%), CoV (2.3%), EV (2.0%), BoV (1.9%) and PIV (0.5%). The occurrence of viral ARI was highest 1-5 years of age. Some clinical features of viral ARI (ADV, BoV, RV, CoV and RSV) were significantly different. PIV and EV were not. Adenovirus isolated by more than triple in the 2010 compared to 2008 and 2009. Adenovirus isolated in 2009 and 2010 identified most type 3 and isolate in 2011 identified most type 1.

Characteristics of Indoor Air Quality in Subway Station in Busan

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Abstract

The Subway is the major public transportation used by a common people. So the subway station is included in multiple-use facilities on "Control act of indoor air quality on multiple-use facilities. The major pollution sources of indoor air in subway station are outdoor air. Also, the structure of station, ventilation system and both heating and cooling system have a strong influence on indoor air quality. The exposure of pollutant in indoor is more harmful than in outdoor. The research on indoor air quality is fortified in U.S. for these reason. So we have investigated the characteristics of indoor air quality in subway station to establish countermeasures for controlling indoor air quality.

This study is Indoor air quality monitoring system in subway station in busan During year 2011

Monthly average PM10 level is the highest in February because of the yellow dust. And the concentration is in the range of 38~66 $\mu\text{g}/\text{m}^3$ in all monitoring sites.

Monthly average CO level is the highest in from June to August in all sites. Especially, D station having the highest CO level is judged to be influenced by basement garage.

Monthly average CO₂ level is in the range of 457 ~ 578 ppm. And there were few changes in CO₂ level by month, hour and monitoring sites.

Monthly average NO₂ level is the highest in February and June. And there has been a decrease in NO₂ level in other time.

Key words : IAQ, Subway station

Molecular Epidemiology of Human Enterovirus Isolated from Busan in 2011

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Abstract

Human Enteroviruses (HEVs) are a major causing-viruses of herpangina, HFMD(hand, foot, and mouth disease) and other neurological diseases. This study was carried out to investigate the epidemiological characteristics for HEVs in Busan area from January to December, 2011. 1,200 specimens were totally collected from hospitalized patients and were tested for HEV from stool, cerebrospinal fluid and throat swab using cell culture and real-time Reverse transcription polymerase chain reaction(RT-PCR). 215 positive specimens were grouped into 11 different HEV genotypes using VP1 RT-PCR. The major etiological agents were Coxsackievirus B5 (n=60, 27.6%) and Enterovirus 71(n=16, 7.4%). The occurrence was found to be distributed all year with the highest occurrence rate during summer season (May to September, n=179, 83.3%). The majority of the enterovirus was isolated from specimens under 14 years old and especially, the highest occurrence showed to specimens under on month old(n=62, 28.8%). Enterovirus isolates were distributed into male (111 cases, 51.6%) and female (104 cases, 48.4%).

Key words : Human Enterovirus, Coxsackievirus A(CA), Enterovirus 71(EV71), Coxsackievirus B(CB), Echovirus

Evaluation of the Suyeong River Water Quality by Principal Component Analysis

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Key words : water quality ; principal component analysis ; temporal variation

Introduction

The Suyeong River has a drainage basin of about 200 square kilometers, a length of about 28.2 kilometers and a breadth ranging between 50 and 90 meters. The Suyeong River includes several branches such as the Oncheon Stream, the Dongnae Stream and the Seokdae Stream(Kim, 2000, Choi et al, 2006). This river passes through the residential area, the commercial area and the industrial area. Because of the Hoidong Catchment which is located on the midstream of the Suyeong River, the ecosystem of the Suyeong River has altered. The urbanization of many sites along the Suyeong River also increased the contamination of the river.

The results of Yang' s study indicated that the inflow from the land controlled the water quality of the Suyeong River(Kim, 2000). According to the Cho's results of the water quality modelling of the Suyeong Bay located on the lower Suyeong River, the water quality of the beaches nearby got worse because of the the pollutants in the Suyeong River(Cho, 1995). Choi et al reported that the major pollutant source of the Suyeong River was one of its branches, the Oncheon Stream(Choi et al, 2006). So the Busan city authorities have promoted water quality improvement projects such as repair of the old sewer pipes and supplement of the clean water of the Nakdong River and the Hoidong Catchment to the Suyeong River. The water quality of the Suyeong River has been varied with various external factors like this. Many researchers have used the PCA(Principal Component Analysis) technique to evaluate the water quality(Shin et al, 1998 ; Barbieri et al, 1999 ; Kim, 2002 ; Karim and Tara, 2003 ; Ying, 2005; Kim, 2006 ; Kim et al, 2007). This technique is designed to reduce the number of variables to a small number of indices.

So the aim of this research is to evaluate the characteristics of the Suyeong River water quality using the principal component analysis(PCA) technique to interpret the large sets of data resulting from long-term monitoring programmes.