Contents

(click on page numbers for links)

ENVIRONMENTAL
Beryllium natural background concentration and mobility: a reappraisal examining the case of high Be bearing pyroclastic rocks ..........3
Protective role of trace elements against cadmium induced alterations in the selected oxidative stress enzymes in liver and kidney of fresh water teleost, Oreochromis mossambicus (Tilapia) ...........4

MEDICAL
Automated online pre-treatment and cleanup recycle coupled with high-performance liquid chromatography-mass spectrometry for determination of deca-bromodiphenyl ether in human serum ..................5
Peroxiredoxin 6 is a molecular target for 1,2-naphthoquinone, an atmospheric electrophile, in human pulmonary epithelial A549 cells.......5
DNA microarray analysis of human neuroblastoma SH-SYSY cells exposed to methylmercury .................................................................6
Identification of thalidomide-specific transcriptomics and proteomics signatures during differentiation of human embryonic stem cells.................................................................6
Cytotoxic and DNA-damaging properties of glyphosate and Roundup in human-derived buccal epithelial cells ..................................7

OCCUPATIONAL
Persistent organic pollutants including polychlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans in firefighters from Northern California .........................................................8
Serum concentrations of p,p’-dichlorodiphenyltrichloroethane (p,p’-DDE) in a sample of agricultural workers from Bolivia ......................9
Workplace Health Promotion Program on Using Dietary Antioxidants (Anthocyanins) in Chemical Exposed Workers .....................10
Analysis and research on result of Minnesota Multiple Personality Inventory among 3890 aerospace workers ........................................11
Mortality in chrysotile asbestos workers in China ..................................12

PUBLIC HEALTH
Renal function after reduction in cadmium exposure: an 8-year follow-up of residents in cadmium-polluted areas .........................13
Contents

Serum concentrations of organochlorine pesticides and growth among Russian boys .................................................................14
Public health risk assessment associated with heavy metal and arsenic exposure near an abandoned mine (Kirki, Greece) .......................15
Levels, spatial distribution and possible sources of heavy metal contamination of suburban soil in Jhansi ................................................15
Consequences of ingestions of potentially corrosive cleaning products, one-year follow-up ...........................................................16

SAFETY
Multi-use personal ventilation/filtration system ..................................................17
Risk assessment of the ignitability and explosivity of aluminium nanopowders ........................................................................17
Falling-film absorber for absorbing and recycling corrosive gas at normal pressure without leakage ....................................................18
Beryllium natural background concentration and mobility: a reappraisal examining the case of high Be bearing pyroclastic rocks

2013-04-15

Beryllium (Be) is widely distributed in soils at low levels, but it can also occur naturally in higher concentrations in a variety of materials exploited for many industrial applications. Beryllium is also one of the most toxic natural elements and is known to be a human carcinogen. A concise account of the literature data on baseline concentrations of Be in soils illustrates the possibility of worldwide presence of areas with a high natural background concentrations of Be (up to 300 mg/kg), the crustal abundance of which is generally established to be in the range 2-6 mg/kg. Nevertheless, the number of available data is rather limited in comparison with those about other toxic elements such as Pb, Cd and Cr. This has probably caused the choice of low values of concentration level as the reference for the definition of soil contamination: these values are not always realistic and are not applicable to large areas. As a case study, the authors report and analyse a diffuse, unusually high natural occurrence of beryllium in loose and poorly consolidated pyroclastic layers related to the Pleistocene activity of the Vico volcano. Additionally, the analogy of Be leachability has been carried out, providing evidence of a not negligible mobility in contrast with the scarce data presented in the literature that usually indicate Be as an element with low mobility in oxidising surface environmental conditions. This research marks the beginning of a possible reappraisal of beryllium geochemical behaviour and background levels, providing more realistic reference values for risk assessment and land management.

Authors: Armiento, Giovanna; Bellatreccia, Fabio; Cremisini, Carlo; Della Ventura, Giancarlo; Nardi, Elisa; Pacifico, Renata

Full Source: Environmental Monitoring and Assessment 2013, 185(1), 559-572 (English)
The present study investigated Cd induced alterations in the lipid peroxidation (LPO) and antioxidant enzymes in the liver and kidney of fresh water teleost, Oreochromis mossambicus (Tilapia) exposed to Cd.

Cadmium (Cd) is a non-essential heavy metal that enters human and animal bodies via different industrial products, environmental pollution and different contaminated foods. The present study is carried out to investigate Cd induced alterations in the lipid peroxidation (LPO) and antioxidant enzymes such as superoxide dismutase (SOD) and catalase (CAT) in liver and kidney of fresh water teleost, Oreochromis mossambicus (Tilapia) exposed to Cd before and after supplementation with trace elements such as calcium (Ca) and zinc (Zn) either individually or in combination. The fish were exposed to cadmium chloride (CdCl2) at a dose of 1/10th LC50. After 15 days (d) of Cd exposure, the fish were then supplemented with trace elements like Ca (1ppm) and Zn (1ppm) either individually or in combination for again 7, 15 and 30 d time intervals. After the specified time intervals, liver and kidney tissues were isolated and used for assay of antioxidant enzymes as well as LPO. Results revealed significant elevation of LPO during Cd exposure for all the time durations. Maximum LPO level was found in 30d Cd exposed fish liver tissue than kidney. Both SOD and CAT activity levels were markedly inhibited at all the time intervals of Cd exposure. After supplementation with trace elements Ca and/or Zn, the LPO levels were significantly decreased. Maximum decrease in LPO levels were found in kidney and liver under Ca alone supplementation followed by combination of Ca + Zn and Zn alone supplementation. Maximum SOD activity levels were found in 30d Zn supplemented kidney tissue followed by 30d combined supplementation of Ca and Zn. Whereas Maximum CAT activity levels were found in 30d Ca supplemented kidney tissue followed by 30d combined supplementation of Ca and Zn. the authors concluded that findings clearly evidenced that the Ca alone supplementation is very effective in reducing the Cd toxicity when compared to other modes of supplementation in the teleostean fish Oreochromis mossambicus.

Author: Jamakala, Obaiah; Rani, Usha A.

Full Source: International Journal of Pharmacy and Pharmaceutical Sciences 2012, 4(Suppl. 5), 303-310 (English)
Automated online pre-treatment and cleanup recycle coupled with high-performance liquid chromatography-mass spectrometry for determination of deca-bromodiphenyl ether in human serum

2013-04-15

Automated online SPE-HPLC-MS was established for the determination of deca-bromodiphenyl ether in human serum. The online SPE with large volume injection was utilised to enhance the sensitivity. Online SPE with dilution line greatly decreased matrixes effect, which enabled serum samples to be injected directly into pre-column. Washing line was designed for the system to solve the serious residual phenomenon and reduce the risk of sample wastage and contamination. Under the optimised conditions, the linear of the method was in the range 0.1-10 ng/mL with the LOD of 0.026 ng/mL. The recoveries of serum samples spiked with deca-bromodiphenyl ether at 0.5 ng/mL was in the range from 83.30 to 102.7% with RSD in interday less than 8.67%. The satisfactory results demonstrated that the method of online sample pre-treatment and cleanup recycle were reliable for human serum analysis.

Authors: Lin, Xuexia; Li, Hai-Fang; He, Xiangwei; Hashi, Yuki; Lin, Jin-Ming; Wang, Zhihua

Full Source: Journal of Separation Science 2012, 35(19), 2553-2558 (Eng)

Peroxiredoxin 6 is a molecular target for 1,2-naphthoquinone, an atmospheric electrophile, in human pulmonary epithelial A549 cells

2013-04-15

Peroxiredoxin 6 (Prdx6) is predominantly expressed in lung tissue and functions in antioxidant defence by facilitating the repair of damaged cell membranes via reduction of peroxidised phospholipids. In the present study, human A549 pulmonary epithelial cells were exposed to 1,2-NQ to explore whether 1,2-NQ can bind covalently to Prdx6, thereby disrupting its catalytic activity. Two-dimensional SDS/PAGE followed by western blot analysis with a specific antibody against 1,2-NQ showed that Prdx6 was covalently modified by 1,2-NQ. Using purified human Prdx6, it was found that 1,2-NQ bound covalently to Prdx6 through Cys47, Lys144 and Cys91, resulting in a significant reduction in phospholipase A2 activity. These
results suggest that arylation of Prdx6 by 1,2-NQ may, at least in part, be involved in the cellular toxicity induced by 1,2-NQ.

Authors: Takayama, Naoyuki; Iwamoto, Noriko; Sumi, Daigo; Shinkai, Yasuhiro; Tanaka-Kagawa, Toshiko; Jinno, Hideto; Kumagai, Yoshito

Full Source: Journal of Toxicological Sciences 2011, 36(6), 817-821 (Eng)

**DNA microarray analysis of human neuroblastoma SH-SY5Y cells exposed to methylmercury**

2013-04-15

To investigate the adaptive response to the environmental electrophile methylmercury (MeHg), DNA microarray analogy of human neuroblastoma SH-SY5Y cells exposed to sub-cytotoxic dose of MeHg (1 μM) for 6 h was performed. The expression of 15 genes increased 10-fold or more in response to MeHg. Four of these genes are associated with detoxification and excretion of MeHg into the extracellular space, and are regulated by transcription factor Nrf2 through the electrophile response element. Interestingly, Cullin3, a negative regulator of Nrf2, was identified as a down-regulated gene during MeHg exposure.

Authors: Toyama, Takashi; Yoshida, Eiko; Shinkai, Yasuhiro; Kumagai, Yoshito

Full Source: Journal of Toxicological Sciences 2011, 36(6), 843-845 (Eng)

**Identification of thalidomide-specific transcriptomics and proteomics signatures during differentiation of human embryonic stem cells**

2013-04-15

Embryonic development can be partially recapitulated in vitro by differentiating human embryonic stem cells (hESCs). Thalidomide is a developmental toxicant in vivo and acts in a species-dependent manner. Besides its therapeutic value, thalidomide also serves as a prototypical model to study teratogenicity. Although many in vivo and in vitro platforms have demonstrated its toxicity, only a few test systems accurately reflect human physiology. Global gene expression and proteomics profiling were used to demonstrate hESC differentiation and thalidomide embryotoxicity/teratogenicity with clinical relevant dose(s). Proteome analogy showed loss of POU5F1 regulatory proteins PKM2 and RBM14 and an over expression of proteins involved in neuronal
The aim of this investigation was to study the cytotoxic and genotoxic properties of G and R (UltraMax) in a buccal epithelial cell line (TR146), as workers are exposed via inhalation to the herbicide.

Cytotoxic and DNA-damaging properties of glyphosate and Roundup in human-derived buccal epithelial cells
2013-04-15
Glyphosate (G) is the largest selling herbicide worldwide; the most common formulations (Roundup, R) contain polyoxyethyleneamine as main surfactant. Recent findings indicate that G exposure may cause DNA damage and cancer in humans. The aim of this investigation was to study the cytotoxic and genotoxic properties of G and R (UltraMax) in a buccal epithelial cell line (TR146), as workers are exposed via inhalation to the herbicide. R induced acute cytotoxic effects at concentrations >40 mg/l after 20 min, which were due to membrane damage and impairment of mitochondrial functions. With G, increased release of extracellular lactate dehydrogenase indicative for membrane damage was observed at doses >80 mg/l. Both G and R induced DNA migration in single-cell gel electrophoresis assays at doses >20 mg/l. Furthermore, an increase of nuclear aberrations that reflect DNA damage was observed. The frequencies of micronuclei and nuclear buds were elevated after 20-min exposure to 10-20 mg/l, while nucleoplasmatic bridges were only enhanced by R at the highest dose (20 mg/l). R was under all conditions more active than its active principle (G). Comparisons with results of earlier studies with lymphocytes and cells from internal organs indicate that epithelial cells are more susceptible to the cytotoxic and DNA-damaging properties of the herbicide and its formulation. Since genotoxic effects...
In this study, poly-chlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs and PBDD/Fs) were measured in serum of twelve firefighters sampled after a fire event in San Francisco, California, along with polybrominated di-Ph ethers (PBDEs), polychlorinated biphenyls (PCBs), p,p’-DDE, hexachlorobenzene (HCB), perfluorinated chemicals (PFCs), bisphenol-A (BPA) and tetrabromobisphenol-A (TBBPA). TEQpCDD/F concentrations were relatively low (mean 5 pg (g lipid weight)-1, lw, range 1-11 pg (g lw)-1), but concentrations of 1,2,3,4,6,7,8-HpCDD, a congener indicative of exposure during firefighting, were elevated. Tentative WHO2005-TEQs calculated for PBDD/Fs in our samples (mean 104 pg (g lw)-1, range 0.2-734 pg (g lw)-1) suggested that PBDD/Fs may contribute substantially to dioxin-like toxicity in individual firefighters. PBDE concentrations were elevated in firefighter serum (mean 135 ng (g lw)-1, range 48-442 ng (g lw)-1). PBDE-209, PBDE-47 and PBDE-153 were prevalent congeners; PBDE-209 contributed >50% of the total PBDE concentration in four individuals, implying continuous occupational exposure to deca-BDE. Perfluorooctanesulfonate (PFOS) was the dominant PFC in serum (mean 12 ng ml-1 wet weight, ww, range 3 ng (ml ww)-1 to 59 ng (ml ww)-1), followed by perfluorooctanoic acid (PFOA) (mean 7 ng (ml ww)-1, range 2 ng (ml ww)-1 to 12 ng (ml ww)-1). Concentrations of perfluorononanoic acid (PFNA) (mean 2 ng (ml ww)-1, range 1-4 ng (ml ww)-1) were higher than those reported in the high-smoke exposure group of World Trade Centre fire responders, suggesting that the California firefighters were exposed to PFNA in smoke during firefighting. The authors concluded that given their elevated rates of cancers, these results were found after short exposure to concentrations that correspond to a 450-fold dilution of spraying used in agriculture, the findings indicate that inhalation may cause DNA damage in exposed individuals.
In the present study, the authors assessed human exposure to p,p’-DDE in a sample of agricultural farmers from three rural communities in eastern Bolivia.

Serum concentrations of p,p’-dichlorodiphenyltrichloroethane (p,p’-DDE) in a sample of agricultural workers from Bolivia
2013-04-02

Organochlorine pesticide p,p’-dichlorodiphenyltrichloroethane (DDT) is still used for vector control in several tropical and subtropical areas of South America and there is evidence of recent illegal use in agriculture. Its main breakdown product in the environment and living organisms is p,p’-dichlorodiphenyl dichloroethylene (p,p’-DDE), which is considered a marker of past exposure to DDT. In the present study, the authors assessed human exposure to p,p’-DDE in a sample of agricultural farmers from three rural communities in eastern Bolivia. In addition, o,p’-DDT was analysed as a surrogate of a potential ongoing exposure to the pesticide. Face-to-face questionnaires were performed, and serum samples were analysed by high-resolution gas chromatography with mass spectrometry. p,p’-DDE was found in 100% of the samples, with a median concentration of 19.7 ng mL⁻¹ (4788.7 ng/g lipid), while o,p’-DDT was detected in 3 samples (4.3%). Serum p,p’-DDE concentrations were associated with time of residence in the study area, personal hygiene after work, and body mass index in adjusted multinomial logistic regression models with tertiles of p,p’-DDE as the dependent variable. The authors concluded that the findings from this study revealed high levels of exposure to p,p’-DDE, which might be derived from a heavily polluted local environment and past occupational exposure. These results deserve further attention due to the potential associated health risks and point to the need for the continuous monitoring of these populations.

Authors: Mercado, Luis A.; Freille, Sara M.; Vaca-Pereira, Jasmin S.; Cuellar, Miriam; Flores, Lizbeth; Mutch, Elaine; Olea, Nicolas; Arrebola, Juan P.

Full Source: Chemosphere 2013, Ahead of Print (English)
Workplace Health Promotion Program on Using Dietary Antioxidants (Anthocyanins) in Chemical Exposed Workers

2013-04-02

Workplace health promotion is a business management system that aims to promote and improve the health situations of all employees in a comprehensive and sustainable mode, and should be seen as an equal partner for occupational health and safety. Certain industrial hazards (in particular chemical agents) display oxidant capacity in the human body acting via oxidative stress, caused by a cellular excess of reactive oxygen and nitrogen species. Species like superoxide and hydrogen peroxide are involved in protein kinase regulation, while nitric oxide and peroxynitrite inactivate phosphatases as well as activating kinases, which are key agents for translating signals of cell needs into metabolic change through enzyme action, gene transcription, protein synthesis, and biochemical flux. These reactions are permanently balanced by the redox system, a non-equilibrium thermodynamic state as a basic part of aerobic life, detected by relative and constantly changing amounts of oxidative and antioxidative (reductive) agents. Review of a large number of studies shows that external sources of antioxidants, mainly fruits and vegetables, are a real benefit for human defence mechanisms, considering now that sufficient scientific evidence exists for public health policy to promote a plant-rich diet. The present study focuses on anthocyanins, as highly potent phytochemical antioxidants expected to protect us from oxidative injury. Furthermore, these specific antioxidants were found to act against lipoperoxidation and oxidative stress induced by industrial chemicals like carbon tetrachloride, paraquat or heavy metals. Anthocyanin extracts of Vaccinium Myrtillus (bilberry) improve night vision and eyestrain caused by excessive computer use. Because of the antioxidant skin protection against UVB radiation, these phytochemicals can be used (both local and oral administration) by workers from oil-bearing platforms, furnaces or agriculture. The authors believe that such important findings may be used for workplace health promotion projects in chemical industry, in order to prevent occupational diseases or work-related diseases. The individual approach of workplace health promotion focuses on the health-related behaviours of employees, and is called risk factor reduction (educational approach). the authors focused their initiative on using dietary natural antioxidants by running health campaigns, and raising awareness of the harmful effects of chemical agents and xenobiotics, addressed both to employees and managers. A one-year project was proposed sustaining...
behaviour change mainly through educational and informative sessions, based on assessment of workers’ needs and also on developing healthy lifestyles. The authors want to encourage company managers to offer antioxidant supplements/fresh fruits/berries juices to those employees who are working in harmful conditions, considering a daily estimated intake of 200 mg anthocyanins. Health promotion on consuming anthocyanins-rich fruits and vegetables may contribute in reducing age-related neurodegenerative diseases such as Parkinson’s disease and Alzheimer’s disease, age-related metabolic diseases (especially cardiovascular diseases), and not at least, cancer. Designing potent antioxidant phytococktails and standardised mixtures of anthocyanins for human consumption will be a great challenge on essentially interdisciplinary research topic involving interaction of nutritionists, physicians, chemists, pharmacists and others.

Authors: Stoia, M.; Oancea, S.

Full Source: Procedia Engineering 2013, Ahead of Print (English)

Analysis and research on result of Minnesota Multiple Personality Inventory among 3890 aerospace workers

2013-04-02

In this study, the authors investigated aerospace workers’ personality traits and analysed the different factors on the effect of the personality test, to prevent and solve the health problems and provide scientific basis. 4 000 aerospace workers were examined by self-edited questionnaire and the Minnesota Multiple Personality Inventory (MMPI). 3 890 effective questionnaires (97%) were collected and their results were analysed. The subjects were grouped according to different genders, occupations, environments, and MMPI clinical scores among different groups were compared. Hysteria (Hy) scale showed higher positive subjects, up to 1 199(30.8%), which can fully reflect the personality of psychological problems. Compared with females, the males were higher in T scores in Hy scale (P<0.01), and male populations were fewer in schizophrenia (Sc) and social introverted (Si) scale, (all P<0.01). Hy T scores of personals engaged in personnel management were significantly higher than those of personals engaged in sci-tech development, quality control, machine installation (P<0.05 or <0.01). But in Sc score, personals engaged in personnel management were significantly lower than those engaged in sci-tech development, quality control, machine installation and rear service (P<0.05 or <0.01). Personnel management got lower scores than sci-tech development, quality control and mechanical installation.
This review elaborates recent studies on cancer mortality and non-malignant respiratory diseases in Chinese chrysotile asbestos workers.

Mortality in chrysotile asbestos workers in China

China has been the world’s top chrysotile asbestos consumer and producer. However, the national mortality rate for asbestos-related diseases, particularly from malignancies, is unknown. This review elaborates recent studies on cancer mortality and non-malignant respiratory diseases in Chinese chrysotile asbestos workers. Studies conducted in asbestos products factory workers and miners have demonstrated strong associations between exposure to chrysotile and mortality rates for lung cancer and non-malignant respiratory diseases. Mortality rates for lung cancer and non-malignant respiratory diseases in both asbestos workers and miners are four and three times higher, respectively, than expected, which are greater than those seen in studies from western countries, likely a reflection of heavier exposures and less effective protection for workers. An increased risk of gastrointestinal cancer was also detected in chrysotile miners. However, there have been surprisingly few reported cases of mesothelioma. This could, at least partially, indicate a problem in diagnosis. Given the substantially increased death risks for lung cancer and non-malignant respiratory diseases, urgent efforts must be made to implement occupational health and safety regulations and decrease workers’ exposures to prevent a future heavier disease burden. Meanwhile, improvements in diagnostics and systematic
During the present study, the authors assessed the evolution of Cd-induced renal effects after a reduction in dietary exposure to Cd in rice. Four hundred and twelve residents in previously Cd-polluted and non-polluted areas were examined twice, in 1998 and in 2006. Changes in blood Cd, urinary Cd, and kidney function [N-acetyl-â-D-glucosaminidase (NAG), â2-microglobulin, and albumin in urine] were measured. In the most polluted area, mean blood Cd was 8.9 ìg/L and 3.3 ìg/L in 1998 and in 2006, respectively, and urinary Cd was 11.6 and 9.0 ìg/g creatinine. Urinary albumin in 1998 increased with urinary Cd, but no such exposure response relation appeared for 2006 albumin versus urinary Cd 1998, indicating recovery. Other biomarkers of kidney function were also elevated in 1998. Partial recovery was observed for NAG among women and was suggested for â2-microglobulin among young individuals. The probability of having â2-microglobulin levels above the 95th percentile in 2006 was high in those with elevated â2-microglobulin in 1998 [odds ratio (OR) 24.8; 95% confidence interval (CI): 11.2, 55.3] compared with albumin (OR) 3.0; 95% CI: 1.2, 7.3) and NAG (OR 2.6; 95% CI: 1.6, 4.4). The authors concluded that the findings suggest that a Cd-mediated increase in urinary albumin excretion is reversible upon substantial reduction of exposure. For markers of tubular effects, the authors observed a tendency toward improvement but not complete recovery. Data from repeated observations suggest that â2-microglobulin
The present study evaluated the associations of OCPs with longitudinally assessed growth among peripubertal boys from a Russian cohort with high environmental OCP levels. A cohort of 499 boys enrolled in the Russian Children's Study between 2003 and 2005 at 8-9 years of age were followed prospectively for 4 years. At study entry, 350 boys had serum OCPs measured. Physical examinations were conducted at entry and annually. The longitudinal associations of serum OCPs with annual measurements of body mass index (BMI), height, and height velocity were examined by multivariate mixed-effects regression models for repeated measures, controlling for potential confounders. Among the 350 boys with OCP measurements, median serum hexachlorobenzene (HCB), α-hexachlorocyclohexane (αHCH), and p,p'-dichlorodiphenyldichloroethylene (p,p'-DDE) concentrations were 159 ng/g lipid, 168 ng/g lipid, and 287 ng/g lipid, respectively. Age-adjusted BMI and height z-scores generally fell within the normal range per World Health Organization standards at entry and during follow-up. However, in adjusted models, boys with higher serum HCB, αHCH, and p,p'-DDE had significantly lower mean [95% confidence interval (CI)] BMI z-scores, by -0.84 (-1.23, -0.46), -1.32 (-1.70, -0.95), and -1.37 (-1.75, -0.98), respectively, for the highest versus lowest quintile. In addition, the highest quintile of p,p'-DDE was associated with a significantly lower mean (95% CI) height z-score, by -0.69 (-1.00, -0.39) than that of the lowest quintile. The authors concluded that serum OCP concentrations measured at 8-9 years of age were associated with reduced growth, particularly reduced BMI, during the peripubertal period, which may affect attainment of optimal adult body mass and height.

Authors: Burns, Jane S.; Williams, Paige L.; Sergeyev, Oleg; Korrick, Susan A.; Lee, Mary M.; Revich, Boris; Althshul, Larisa; Del Prato, Julie T.; Humblet,
In order to assess these risks, samples from around the mine were collected and analysed and a scenario involving the oral, dermal, and inhaled doses of arsenic and heavy metals was formulated.

Public health risk assessment associated with heavy metal and arsenic exposure near an abandoned mine (Kirki, Greece)

2013-04-02

The Agios Philippos’ lead zinc mine in the Kirki region (NE Greece) is now closed, but its legacy of heavy metal contamination remains at the site. At present, management of the contaminated land is of major concern. The area is in a reclamation process and requires immediate remediation action, whereas human risks need to be carefully evaluated. In order to assess these risks, samples from around the mine were collected and analysed and a scenario involving the oral, dermal, and inhaled doses of arsenic and heavy metals was formulated. A Monte Carlo approach was undertaken, in order to model the average daily dose and quantify the corresponding hazard index and cancer risk. A toxicological risk was associated with samples collected in the vicinity of the mine (floatation, mine tailings) and a pronounced carcinogenic risk for arsenic was evident at the broader occupational/environmental setting. The authors concluded that these findings urge for immediate rehabilitation actions that will mitigate population exposures and promote long-term environmental safety in the area.

Authors: Nikolaidis, Christos; Orfanidis, Moysis; Hauri, Dimitri; Mylonas, Stratos; Constantinidis, Theodore

Levels, spatial distribution and possible sources of heavy metal contamination of suburban soil in Jhansi

2013-04-02

Heavy metal pollution has become a serious health concern in recent years, because of industrial and agricultural development. Heavy metals of industrial bio-waste contaminate drinking water, food and air. The toxic heavy metals of great concern are Cd, Pb and Hg, which are usually associated with harmful effects in men and animals. It is recognised that heavy metals may exercise a definite influence on the control of biological
functions, affecting hormone system and growth of different body tissues. Many heavy metals accumulate in one or more of the body organs with differing half-lives. The Heavy Metal Pollution Index (HPI) of ground water was found to be far below the index limit of 100 points indicating that the ground water was not polluted with heavy metals in spite of the prolific growth of mining and allied industrial activities near the town. India revealed that Cd concentration varied from 1.0 to 9.1 ppm, Cu varied from 8.0 to 10.2 ppm and Pb content ranged from 0.1 to 10.4 ppm. In many district of Uttar Pradesh, India, most of the water bodies are being used for the cultivation of edible aquatic plants. It was found to be contaminated with a variety of toxic metals like Fe, Cu, Cr, Mn and Pb. Soils irrigated with the effluents had higher contents of micronutrients and heavy metals as compared to the corresponding well irrigated soils, water, soil, grass and mineral salt samples to investigate the sources of toxicity in animals. In the present study, the authors discussed the metal Pb, Cd, Zn, Ni, Cu, Fe and Mn are in different concentration in all the study Jhansi sites.

Authors: Kannaujia, Ravi Kant; Singh, Surjeet
Full Source: Oriental Journal of Chemistry 2012, 28(4), 1913-1918 (English)

Consequences of ingestions of potentially corrosive cleaning products, one-year follow-up
2013-04-02

Cleaning products are responsible for many accidental exposures among children and adults and depending on the composition, they may cause a corrosive damage. In this study, the authors focused on the counts, consequences of exposures to the products, symptoms, first aid and treatment provided with special attention to the products the label of which did not correspond to the detailed composition of the product in the material safety data sheets. The outcomes of exposures of cleaning household products have been collected in a prospective study during one year based on the calls to the Czech Toxicology Information Centre between 1 January 2009 and 31 December 2009. Cleaning products were divided into five categories according to their use and chemical characteristics. Altogether 40 subjects were admitted to the hospital. Total 31 endoscopy (ES) were performed. ES findings brought normal finding in 12 cases, 1st grade in 17. In only two patients 2nd - 3rd grade injuries of the gastrointestinal tract (GIT) were found. The label of all cleaning products should show the contents and percentage of all hazardous substances. The dose is frequently uncertain and the broad corrosives composition range and unreliable labelling may contribute to futile
In this study, the authors describe the multi-use personal ventilation/filtration system. The ventilation device uses a cross-flow fan and one or more filters, where the filter preferably has a J-shape that at least partially surrounds the rotor of the cross-flow fan. In one embodiment, the filter includes a plurality of pleats, preferably along a bottom surface of the filter. The filters preferably remove particles, undesired gases, and micro-organisms. A filtration and ventilation system with at least one first ventilation device and at least one second ventilation device larger than the first ventilation device, as well as a method of filtering contaminants out of air using a personal ventilation device, are also disclosed.

Authors: Kummer, Joseph; Allred, Iii, Jimmie B.


Risk assessment of the ignitability and explosivity of aluminium nanopowders

2013-04-15

An extensive study has been carried out in order to assess the ignition sensitivity and explosivity of aluminium nanopowders. It showed notably that, as the particle size decreases, minimum ignition temperature and minimum ignition energy decrease, indicating higher potential inflammation. However, the explosion severity decreases for diameters lower than 1 ìm. As a consequence, this study leads to the conclusions that the ignition sensitivity and explosion severity of aluminium nanopowders may be affected by various phenomena, as pre-ignition, agglomeration/
aggregation degree and the intrinsic alumina content. The presence of wall-quenching effects and the predominance of radiation compared to conduction in the flame propagation process have to be discussed to ensure the validity of the 20 L sphere and of the results extrapolation.

Based on the peculiar behaviours that had been previously highlighted, a specific risk analysis has been developed in order to assess the fire and explosion risks of such materials. It has been applied to an industrial plant of aluminium nanopowders production. The hazard identification and the consequence modelling steps, especially the quantification of the likelihood and consequences, have been designed specifically. The application of this method has led to the definition of the most adequate safety barriers.

Authors: Vignes, A.; Munoz, F.; Bouillard, J.; Dufaud, O.; Perrin, L.; Laurent, A.; Thomas, D. (INERIS, F-60550 Verneuil-en-Halatte, France)

Full Source: Process Safety and Environmental Protection 2012, 90(4), 304-310 (Eng)

Falling-film absorber for absorbing and recycling corrosive gas at normal pressure without leakage
2013-04-15
In this study, the authors discuss the falling-film absorber used for absorbing and recycling corrosive gas at normal pressure. The title falling-film absorber comprises a cylinder, a gas inlet, an upper positioning plate with via holes, a lower positioning plate with via holes, a pull rod pipe spacer, a membrane distributor for increasing absorbing drive power, sieve plates, an exhaust gas outlet pipe, a liquid inlet for loading a spray liquid, an inner annular plate, an outer annular plate, and a liquid outlet. The falling-film absorber can be used for absorbing and recycling a corrosive gas at normal pressure without leakage. The falling-film absorber has the advantages of high safety and good effects.

Authors: Ma, Huidong

Full Source: Faming Zhuanli Shenqing CN 102,805,995 (Cl. B01D53/78), 5 Dec 2012, Appl. 10,153,316, 31 May 2011; 5pp. (China)