

1671st Conference

INDUSTRIAL CHEMISTRY 2018



17th International Conference on

Industrial Chemistry and Water Treatment

May 21-22, 2018 | New York, USA

Scientific Tracks & Abstracts

Day 1

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Speciation of selenium(IV) (selenite) and selenium(VI) (selenate) levels in human whole blood samples

Victus Bobonkey Samlafo
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This paper examined the speciation of selenium(IV) (selenite) and selenium(VI) (selenate) levels in human whole blood samples from Tarkwa and its environs, a mining-impacted area in Ghana, using hydride generation atomic absorption spectrophotometric technique. Selenium (IV) in the experimental subjects ranged from 0.08 ± 0.01 $\mu\text{g/mL}$ to 0.50 ± 0.02 $\mu\text{g/mL}$ with a mean of 0.29 $\mu\text{g/mL}$, while the control ranged from 0.02 ± 0.1 $\mu\text{g/mL}$ to 0.21 ± 0.05 $\mu\text{g/mL}$, with a mean of 0.07 $\mu\text{g/mL}$. Significant differences existed between the levels of selenium (IV) concentrations in experimental and control subjects ($p=0.0001 < 0.05$). The selenium (VI) in experimental subjects ranged from 2.97 ± 0.52 $\mu\text{g/mL}$ to 4.39 ± 0.42 $\mu\text{g/mL}$, with a mean of 3.63 $\mu\text{g/mL}$, while the control ranged from 0.60 $\mu\text{g/mL}$ to 1.0 $\mu\text{g/mL}$, with a mean of 0.89 $\mu\text{g/mL}$. Significant differences existed between the levels of selenium (VI) in experimental and the control subjects ($p=5.98 \times 10^{-14} < 0.05$). The measurement precision determined by relative standard deviation was within $\pm 5\%$. The accuracy of the determination was evaluated by analysing certified standard human hair reference material GBW 09101. The observed values were within $\pm 6\%$ of the certified values.

Biography

Victus Bobonkey Samlafo earned his BSc (Chemistry) and Diploma in Education from the University of Cape Coast- Ghana in 1996. He received MSc (Analytical Chemistry) from the Kwame Nkrumah University of Science & Technology, Kumasi, Ghana in 2002. He later had a PhD in Nuclear and Radiochemistry in 2011 from the University of Ghana, Legon (Accra). He has been teaching at the University of Education, Winneba (UEW) since 2004 to date. He is a Senior Lecturer and Acting Head of Integrated Science Education Department. He is currently a member of the Academic Board of UEW, a member of the Science Faculty Board and Past Departmental Examinations Officer for 20015/2016 academic year. He is currently serving as a Reviewer for the following Journals *West Africa Journal of Ecology*, *Journal of Global Ecology and Environment* and *International Journal of Biological Macromolecules*. He attended several conferences and workshops and had 18 referred articles in both international and local journals. He also contributed to a lot of study materials and books.

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Sulfated polysaccharides with potent antiviral activity

Takashi Yoshida

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We have investigated the synthesis and biological activities of sulfated polysaccharides obtained by sulfation of both synthetic and naturally occurring polysaccharides. Ring-opening polymerization of anhydrosugar monomers is a superior method to afford stereo-regular polysaccharides with high molecular weights and define structures. Synthetic polysaccharides become good biomaterials for investigation of the relationship between the structure and biological activity. After sulfation, we found that sulfated polysaccharides had potent anti-HIV activity measured by 50% effective concentration (EC₅₀) as low as 1 µg/mL. In addition, we found that curdlan sulfate, which was prepared by sulfation of the naturally occurring polysaccharide curdlan with a linear 1, 3-β-linked glucopyranoside structure, also completely inhibited the infection of MT-4 cells by HIV at concentrations as low as 3.3 µg/mL. In general, sulfated polysaccharides like heparin have high blood anticoagulant activity, making them unsuitable for AIDS treatment. However, curdlan sulfate has low blood anticoagulant activity (10 unit/mg) and low cytotoxicity. The structure of polysaccharides was analyzed by high resolution NMR measurements and antiviral mechanisms were elucidated by SPR, DLS, and zeta potential with poly-L-lysine as a model peptide of HIV surface protein. The sulfated synthetic and natural polysaccharides were found to have strong interactions with poly-L-lysine, suggesting that the anti-HIV activity was hypothetically due to the interaction of the negatively charged sulfated groups with the positively charged surface proteins of HIV. The antiviral activity of other viruses is also presented.

Biography

Takashi Yoshida has completed his PhD in 1983 at the Graduate School of Engineering, Meiji University (Professor Shojiro Saito). Then, he worked at Nippon Dental University as a Research Associate (1983-1985) and moved to University of Tokyo as a Research Associate during 1985-1993 (Professor Toshiyuki Uryu). During 1988-1989, he had worked at York University (Canada) as a Post-doctoral Researcher. He became an Associate Professor at the Department of Polymer Science, Faculty of Science, Hokkaido University (1993-2001). Since 2001, he is a Professor at the Department of Bio and Environmental Chemistry, Faculty of Engineering, Kitami Institute of Technology. His research interests focuses on the study of bio macromolecules and environmental science.

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Viscoelastic micellar solutions of dimeric surfactants in organic additives: 1H-NMR, rheology, SANS and TEM characterization

Bharatkumar Kanoje and Ketan Kuperkar

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In the present study, we report the effect of organic additives and temperature on the micellization of cationic Gemini surfactants bis- dodecyl dimethyl ethylene diamine (12-2-12). The micellization behavior of Gemini surfactants were studied at different temperatures at 30°C and 50°C in different concentrations of organic additives (phenyl propionic acid) in aqueous solutions. The micellar environment of aqueous solution of Gemini-organic additives transform into spherical to vesicle micelles was investigated using nuclear magnetic resonance spectroscopy, rheology, scattering, infrared, microscopic, and also by dynamic light scattering. Changes in the structural parameters of the micelles with addition of additives were inferred from SANS measurements. The intensity of scattered neutrons at the low q region was found to increase with increasing PPA concentration. This suggests an increase in size of the micelles and/or decrease of intermicellar interactions with increasing salt concentration. Analysis of the SANS data using prolate ellipsoidal structure and Yukawa form of interaction potential between micelles indicates that addition of additives leads to a decrease in the surface charge of the ellipsoidal micelles and consequently an increase in their length. The Nagg were confirmed by the SANS and fluorescence measurement.

Biography

Bharatkumar Kanoje is pursuing his PhD from Applied Chemistry Department, Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat-India. He has published four papers in reputed journals. He has completed his Master's degree in Industrial Chemistry specialization from South Gujarat University, Surat. He is also the Director of two different companies such as Alo Nature Agro Live and B cube Bio care.

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Relation between total residual oxide (TRO) and redox potential (ORP) in seawater sterilization system based on surface discharge plasma

Young Sun Mok, Byeongju Lee and Jin-Oh J
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This work investigated the sterilization of seawater using surface discharge plasma. In this system, the surface plasma produced ozone and short-lived reactive species which were continuously dispersed and dissolved in the biologically contaminated seawater. The indirect treatment of seawater using the surface discharge plasma increased the concentration of total residual oxidant (TRO) by the reaction between ozone and bromine anion that is abundant in seawater to form hypobromite (BrO^-). The hypobromite is the main constituent of TRO and can act as a strong oxidant capable of sterilizing bacteria. The seawater treatment was carried out in a semi-batch system consisting of a 1-L water-jacketed glass vessel and a gas diffuser. The seawater temperature was kept at 20°C. The gas introduced into the surface discharge plasma reactor was oxygen whose flow rate was controlled to 2Lmin⁻¹. The seawater samples taken at a given time interval were mixed with a color reagent, and then the amount of TRO produced by the reaction with ozone was determined using a UV-Vis spectrophotometer at 515nm. The concentration of dissolved ozone and the oxidation-reduction potential (ORP) were simultaneously measured to analyze the relation between ozone, TRO and ORP. It was observed that TRO, ORP and dissolved ozone increased sharply in the early stage, and then the increases were slowed down with the lapse of time. An increase in the discharge power increased both TRO and ORP at the same time, showing a similar tendency. Based on these results, it is possible to relate ORP directly to TRO, which enables us to easily find out the optimal operating condition of the seawater sterilization system.

Biography

Young Sun Mok has completed his BS degree in Chemical Engineering from Yonsei University, Seoul, Korea, in 1989, and the MS and PhD degrees in Chemical Engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 1991 and 1994, respectively. He has been with the Department of Chemical Engineering, Jeju National University, Korea, since 2000. His research interests include applications of non-thermal plasma to pollution (air/water) control, catalysis, energy production, and material syntheses.

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NADP-based colorimetric method for the determination of marine heavy metal pollution using sea urchin (*Tripneustes gratilla*) egg extract

Lirazan Marcelina, Villanueva and John Louis
University of the Philippines Manila, Philippines

A simple, convenient and sensitive method for the detection of the presence of heavy metals in seawater was developed using an enzyme preparation that catalyzes NADP and MTT reduction yielding a colorimetric response, measured using UV-Vis spectrophotometer. This method which was based upon the protocol provided by Sigma Aldrich and Zhu et al (2011) used crude extract of the *Tripneustes gratilla* eggs as source of enzymes such as glucose-6-phosphate dehydrogenase (G6PD), the enzyme responsible for the reduction of NADP. The pH was optimized to ensure maximum NADP-reducing activity and the applicability of the method to seawater was determined. It was found that the NADP-reducing activity increased up until 50mM of NaCl indicating that enzymes such as G6PD in the sea urchin are tolerant to certain concentrations of NaCl. The effect of heavy metals was determined and the potency of heavy metals as inhibitors of NADP-reducing activity was found as follows: $Hg^{+2} > Zn^{+2} > Pb^{+2}$. The qualitative assessment of sea water quality was also performed using the developed method. Of the five sites selected in Manila Bay, three sites showed percent inhibition less than 10% that is not significantly different from the control (artificial seawater). Two sites were found to exceed 10% inhibition, significantly different from the control ($p < 0.05$). This newly developed method may also be used for the detection of pesticides and toxic industrial effluents that would inhibit G6PD, thus, offers means of detecting marine pollution in general.

Biography

Lirazan Marcelina has obtained her PhD in Molecular Biology and Biotechnology from the University of the Philippines. She has completed her dissertation at the University of Utah (USA) under the Overseas Fellowship Program of the Department of Science and Technology (DOST) in the Philippines. She is currently the Chairperson in her Department. She has published 11 papers in reputed journals.

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The behavior of nitrogen soluble forms in natural water in the presence of anionic and cationic surface-active substances and of mineral substrates

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Solid mineral substrates of different nature and dimensions come into contact and interact with the organic substances present in the surface water basins. We studied the influence of the solid granules size of the substrate as well as of the composition of the organic and inorganic water components on the adsorption of organic substances on the substrate surface, on the water basins organic substances accumulation, on the natural water components equilibrium, and on the natural water oxidation-reduction processes. Laboratory simulations were carried out in the water of the Isnovat River (the affluent of the Bac River, which is a tributary of the Nistru River). The model natural water samples containing lauryl sulfate as anionic surface-active substance (SAS An) and cetyltrimethylammonium as cationic surface-active substance (SAS Ct), separately and in a body, as well as the substrates $\text{Al}(\text{OH})_3$, Al_2O_3 , CaCO_3 , H_2SiO_3 , light fraction (clayey) of diatomite and expanded clay powder have been studied. The analysis of the behavior of the soluble nitrogen compounds (NH_4^+ , NO_2^- , NO_3^-) in the samples of natural water has been performed. The effect of the presence of lauryl sulfate has been found to be a fixation and a passivity of the properties of a part of the river water organic matter due to the redox processes brake. The inactivation effect of this part is more effective if compared to the activity of the sample containing both CaCO_3 and the anionic SAS, as in the case of ammonium oxidation. This proves that calcium carbonate powder has an environmental improvement effect for oxidation of the nitrite ion. Oxidation of the nitrite ion as an intermediate step also demonstrates that, indeed, CaCO_3 facilitates the redox process by better fixation and sedimentation of the organic component in the laboratory simulations. Moreover, we have shown that CaCO_3 is the cause of the best cationic separation/inactivation in the presence of both anionic and cationic SASs (including the type with only SAS Ct). The decreasing impact of water self-purification improvement in the rivers water in the series of following substrates (CaCO_3 , $\text{Al}(\text{OH})_3$, Al_2O_3 , H_2SiO_3 , light fraction (clayey) of diatomite, expanded clay powder) has been observed. The sensitivity of the environment to substrate activity modifications is most likely dependent on the nanoparticle size of its granules. An increase in the particle size lead to the reducing of the braking of the self-purification processes during the accumulation of the harmful organic component on their surface, and vice versa, a decrease in the particle size lead to the developing of the braking effect of the redox activity of the nitrogen forms in the river water.

Biography

Francisco Fernandez began his career at Hostos as an adjunct professor in 1992. Then in 2000, he began teaching General Chemistry and Environmental Science courses full time. He said his "worldly" experiences as both a student and a professor have served him well at Hostos and he incorporates that knowledge into his coursework. In past semesters, his students were involved with the analysis of heavy metals contaminating the Harlem River. Currently, plans are underway to work with the Harlem River Project on site remediation and control of environmental issues affecting this part of the Bronx. He has over 25 publications in referred scientific journals, and is the coauthor of a *Physical Chemistry* textbook that was published in Cuba in 1988.

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Effect of adding porcelain on properties of porous ceramic based on electromelted corundum

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Porous ceramics is used throughout the world for filtering, heat insulation, and heat protection. During filtering, important parameters are a porous structure and properties connected with it, i.e., pore size, pore size distribution, average capillary diameter, permeability, and specific surface. There is increasing interest in porous ceramic materials due their capacity to operate at high temperature in corrosive abrasive media. These materials may be used for filtering various liquid (liquid solutions in various solvents, with almost any medium pH, and melts, including metals, polymers, and salts) and also gases. In an article, the effect is studied of the ratio of various fractions of electromelted corundum with a constant content of porcelain binder of mix polyvinyl alcohol (PVL) (5%) liquid on porous ceramic properties. Specimens were compacted under a pressure of 25, 50 and 100MPa and then fired at 1350°C and 1450°C. After that, the samples were prepared by impregnating the ceramic slurry polyurethane foam (PUF), followed by drying and calcining at 1450°C. The flexural strength of the sintered samples without PUF with burnable additives showed from 19 to 151MPa, an open porosity of 17 to 25%, and for the samples duplicated PUF after firing showed the porosity was 60-65%, the compressive strength of 3.5MPa.

Biography

Zaw Ye Maw Oo has completed his PhD from D Mendeleev University of Chemical Technology of Russia by government scholarship. Now, he is attending Post-doctoral studies in that university. He has published more than five papers in reputed journals.

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