Waste water characteristics and treatment from land reclamation using incineration bottom ash

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Reclaiming land from the sea, or land reclamation, causes deviations in the local geochemical and hydrological cycles: Recent advances in technology has enabled waste materials, such as incineration bottom ash (IBA) and marine clay, to be used as land reclamation material, by binding the two together with additives, forming a solid matrix. Such matrices inevitably produce wastewaters during and after the land reclamation processes, potentially impacting the geological, geophysical, hydrological and biological environment. Results showed that while heavy metal concentrations within the matrix meets the Dutch criteria for industrial land use, the wastewaters produced during certain stages may not meet local wastewater discharge standards. The wastewaters produced during the construction stage contain heavy metals, whose concentrations could be controlled by the type construction methods employed. Wastewaters produced from leachates after land reclamation typically showed high concentrations only for one or two metals, selenium and copper. However, these wastewaters could be collected and treated easily, as confinement is part of the land reclamation processes. The use of polyaluminium chloride (PACl) or iron oxide ($\text{Fe}_2\text{O}_3$) could reduce heavy metal concentrations significantly, at different optimal dosages. pH reduction of the alkaline wastewaters could also be achieved through the addition of PACl. This presentation will discuss the potential impacts on the use of IBA in land reclamation, and how they can be mitigated.

Biography
Augustine Quek obtained his PhD from the National University of Singapore, School of Civil and Environmental Engineering, before completing two and a half years of Postdoctoral studies at the same University. He was an Assistant Professor at Nottingham University, before assuming the position of R&D Project Manager at Chemilink Technologies, a specialty chemical company for the construction industry. He has published more than 11 papers in peer-reviewed, international journals, including three review papers on waste to resources.

Synthesis, characterization and application on arsenic (III) adsorption from contaminated water using HCZMO as adsorbent

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Nanocrystalline agglomerated hydrous Ce(IV)-Zr(IV) oxide (Ce/Zr ~1:1, mole/mole) (HCZMO) prepared by chemical precipitation and characterized by SEM,TEM,AFM etc. The prepared adsorbent material showed irregular surface morphology and high surface area (185.04 m² g⁻¹) with pHₐw=5.8 (±0.2), which was employed for high Arsenic (>0.01 mg. L⁻¹) groundwater treatment. The presence of As (III) also confirmed by EDS spectra of As adsorbed surface. The Arsenic adsorption kinetics and equilibrium data obtained at an optimized pH~6.0 described, respectively, the pseudo-second order equation ($R^2=0.98-0.99$) and the Langmuir isotherm ($R^2>0.99$) very well. Langmuir monolayer capacity (θ, mg. g⁻¹) values computed for this reaction was 17.07, respectively. Homogeneous surface nature of HCZMO was evident from the equal distribution co-efficient values and well Langmuir isotherm fit. The Arsenic adsorption reactions at 298 to 313 K with HCZMO were spontaneous (DG°=negative) despite exothermic nature (DH°=negative), owing to the increase of entropy (DS°=positive) indicates a spontaneous exothermic reaction.

Biography
Abir Gosh is pursuing his PhD work on Chemistry under the guidance of Dr. Uday Chand Ghosh and Dr. Sharadindra Chakraborty at the Department of Chemistry, Presidency University from August 2012 as a JRF. He completed his BSc (Chemistry) from Calcutta University (Ramakrishna Mission Vidyamandira (Belur)) in 2010 and his Master degree in 2012 from NIT Durgapur. He is GATE qualified, 2012 and recently has published 2 international papers in reputed journals.

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