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P004

IMPROVED CONTROL OF MULTIPLE ANTIBIOTIC RESISTANCE RELATED MICROBIAL RISK IN SWINE MANURE WASTES BY AUTO-THERMAL THERMOPHILIC AEROBIC DIGESTION

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In this study, we microbiologically evaluated antibiotic resistance and pathogenicity in livestock (swine) manure as well as it's biologically stabilized products. Since ATAD (auto-thermal thermophilic aerobic digestion) treatment of swine manure provided high temperature condition (60-65oC), ATAD method was speculated to efficiently control microbial risk in livestock manure. To test this hypothesis, multiple antibiotic resistance (MAR) and pathogenicity in ATAD-treated swine manure were microbiologically examined and compared with conventionally stabilized (anaerobically fermented) manure. Antibiotic resistance was tested using viable count methods with R2A plates that were amended with either tetracyclin, kanamycin, ampicillin or rifampicin. Pathogenicity was tested using selective culture media for two human pathogenic microorganism indicators (staphylococcus and salmonella). In swine manure and its anaerobically fermented sample, antibiotic resistant microorganisms (ARMs) and the pathogen indicator bacteria were detected. Furthermore, approximately 2-5% of the Staphylococcus and Salmonella colonies from the swine manure and its fermented samples were found to exhibit MAR, suggesting a high level of microbial risk. When the same swine manure was treated by ATAD for 3 days at 60-65oC, however, ARMs, pathogen indicator microbes, and MAR-exhibiting bacteria were not detected in the ATAD-treated sample. These suggest that ATAD significantly improved the removal of microbial risk in swine manure waste.

Keywords: Antibiotic resistance, Swine manure, ATAD (auto-thermal thermophilic Aerobic Digestion), Pathogenic microorganism, MAR (multiple antibiotic resistance)

P006

ARSENIC ADSORPTION ONTO HYDROUS FERRIC OXIDE (HFO) FROM WATER

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In the present study, adsorption of arsenic on hydrous ferric oxide (HFO) generated by chemically and electrochemically (EHFO) was examined and compared for removal of both As (III) and As (V) over a pH range from 6 to 8 with initial arsenic concentration of 2.0 mg/l. The results show the maximum adsorption on EHFO generated by electrochemically than HFO generated by chemically (FeCl3). In a laboratory HFO was generated by adding FeCl3 with addition of NaOH and (EHFO) was generated by using iron electrodes dipped into the water with applying current in electrochemical reactor.

The arsenic removal and residual iron in treated water has been studied and found that arsenic removal was >99 % for EHFO for both As(III) and As(V) as compared to HFO 85% for As(III) and 99 % for As(V). Experiments were carried out with initial arsenic concentration of 2.0 mg/L. Residual iron in treated water after centrifuge was found in the range of 0.085 mg/l to 0.184 mg/l. It is concluded that the above method seems to hold promise for field applications in rural parts of West Bengal, India.

Key Words: Electrochemically hydrous ferric oxide (EHFO), Adsorption; Arsenite; Arsenate; Hydrous ferric oxide (HFO).

P007

REMOVAL OF ARSENIC FROM GROUNDWATER BY ARSENITE-OXIDIZING BACTERIA

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The presence of arsenic in groundwater and soils has been of great public concern. Due to the high toxicity of arsenic, remediation of As-contaminated groundwater, therefore, is necessary to protect the environment and the public health. For purification of arsenic-contaminated groundwater, a bioreactor equipped with a chemical adsorption process was proposed in this study. If arsenite is oxidized to arsenate, arsenic is easily removable from the contaminated groundwater because arsenate is more adsorptive than arsenite.

An enriched mixed culture of heterotrophic bacteria with high arsenite-oxidizing activity was successfully obtained from a soil in Osaka Japan by acclimation processes to high concentrations of arsenite. With initial conditions below 20mM of arsenite, the mixed culture showed high arsenite-oxidizing activity at pH values of 7-10 and at temperatures of 28-35 oC. Predominant arenite-oxidizing bacteria isolated from the mixed culture were identified as Haemophilus, Micrococcus, and Bacillus. Laboratory experiments showed that the mixed culture oxidized 1mM arsenite in contaminated groundwater within 5 days, subsequently more than 99% of arsenate formed by the arsenite oxidation was easily removable from the groundwater through the adsorption process with activated alumina.