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Reducing water consumption in beet distillery through condensate recycling after a membrane-based detoxification process

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Food industry largely depends on water. Availability of good quality resource at a reasonable cost is a pregnant concern, as well as the limitation of effluents, source of matter loss and environmental disorders. Wastewater re-use/recycling may be a solution to face the issue. Low-charged wastewaters (rinsing water, condensates, etc) and process solutions (CIP solutions, brines, regeneration effluents) may be good candidates to recycling or re-use. However, food manufacturers are still reluctant to recycling and reusing water from wastes for different reasons including food safety. Continuous progress in membrane technologies (micro-, ultra -nanofiltration, reverse osmosis, electrodialysis) allow smart and cost-effective solutions to be investigated. The presentation will be illustrated by the case-study of beet distillery. Recycling of condensates arising from stillage concentration as dilution water in the fermentation step would allow significant groundwater sparing and the reduction of pregnant waste disposal problems. Removal of inhibitory molecules (acids, furan derivatives, phenolic compounds) toxic for the yeast can be achieved through convenient purification processes. According to the quality of the condensates, reverse-osmosis (RO) or a combination of RO with ion-exchange proves successful to recover high quality water suitable for the preparation of fermentation musts. Economic insights will also be provided.

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Analysis of total microbial community structure and the ammonia oxidizing populations in activated sludge system of industrial waste water treatment plant

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Bacterial community structure and the prevailing nitrifying activities and populations in each room of a three-compartment activated sludge system were determined. Each space was originally inoculated with the same activated sludge communities encased in polyethylene glycol gel granules, and ammonium nitrogen was fed to the system in a mineral salts solution at a rate of 5.0 g N liter granular enabled sludge-1 day-1. After 150 days of operation, the system was found to comprise number sequential nitrifying reactions, probably mediated by different bacterial populations. Activity data showed that all the NH4-N was completely oxidized of one and two compartments, but no significant nitrite oxidation was observed in these spaces. In contrast, all available nitrite oxidized to nitrate in the room three. To study the microbial populations and communities in this system, total bacterial DNA isolated from each room were analyzed for the community structure based on G+C the content of the component populations. Compartment one showed dominant population groups have 50 and 67% G+C content. Two compartments were the same in structure chamber one. The bacterial communities in space three had dominant populations with 62 and 67% G+C content and retained 50% G+C content population only at a greatly diminished level. The 50% G+C content populations from space a hybridized strongly with ammonia mono oxygenase and hydroxylamine oxidoreductase gene probes from Nitrosomonas europaea. However, 50% G+C content population from space two hybridized strongly with hydroxylamine oxidoreductase probe, but only slightly with ammonia mono oxygenase probe, suggesting that the prevailing ammonia-oxidizing populations in space one and two may be different. As different activities and groups will dominate in every room from an identical inoculum, it appears that the nitrification processes may be somewhat inconsistent, resulting in a series of sequential reactions and the different communities in this three-chamber system

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