

POSTER SUMMARY

**AN ASSESSMENT OF THE DESALINATION METHODS
FOR THE CONCENTRATION OF VINASSE**

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Abstract

With the drive towards sustainable processing and adhering to environmental regulations, it is important to find economic and sustainable ways of dealing with the associated waste streams. Vinasse is an aqueous by-product of the sugar-bioethanol process, consisting mainly of water, organic solids and minerals. Ca^{2+} , Mg^{2+} and K^{+} are some of the main constituents of inorganic matter present in vinasse. Conventional techniques utilised to treat vinasse, such as evaporation and distillation are energy intensive. Hence it was proposed that desalination of vinasse using clathrate hydrate technology be investigated to recover organic salts and recover purified water, since the latent heat of fusion of water is significantly less than the latent heat of vaporisation. The aim of this study was to determine the kinetics of vinasse hydrates and thereafter perform an economic analysis by comparing it to another conventional competing technology which was identified as the multi-effect evaporation process. For any process design it is important to gain an understanding of the kinetics (hydrate formation). Such experiments were undertaken using synthesised vinasse in a benchtop rig (750 ml stainless steel rig). A multi-effect evaporation process was simulated using Aspen Plus® as a series of heat exchangers and flash vessels with a basis of 100 000 kg/h of the synthesised vinasse feed. Results showed that a three-effect evaporator would be sufficient to concentrate vinasse to a final brine concentration of ~50 wt % and yield of ~95% potable water. This method was evaluated and compared to the gas hydrate process.

Keywords: vinasse, concentration, hydrate technology, multi-effect evaporation