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Hot Microbubble Injection in Thin Liquid Film Layers for Ammonia-Water Separation[1] PRATIK DESAI, WILLIAM ZIMMERMAN, University of Sheffield — 140 MT of NH_3 produced p.a. barely keeps up with the global usage of this ubiquitously used commodity. NH_3 manufacture & later remediation from landfill leachate to lower eco-toxicity makes further demands on the energy utilised for this "NH_3 cycle." Moreover, current methods for lowering eco-toxicity destroy NH_3 rather than recovering it. Air stripping is a widely employed low energy industrial process used for NH_3 recovery but has a long processing time-$\cong$24h for 60% efficiency & 100h for 95% efficiency. The solution presented herein is based on hot microbubble injection in thin liquid film layers designed to separate NH_3 from NH_3-H_2O solutions. The transport phenomena exhibited by the microbubbles helps them separate volatile liquids effectively with negligible sensible heat transfer. This process is nearly isothermal simply because evaporation by microbubbles is controlled by internal mixing, which is fast relative to sensible heat transfer, when limited to short contact times in thin films. A 1000-3000-fold increase in mass transfer, over conventional stripping, and a 100% separation efficiency achieved in a processing time of 30 minutes is observed, potentially, if persisting with industrial scale up, resulting in a 200-fold reduction in processing time.

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