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**ZUR INGENIEURBIOLOGIE**

**Heft 41**

**Degradation of Whey in an Anaerobic  
Fixed Bed (AnFB) Reactor**

**Marisa Handajani**



# Degradation Of Whey In An Anaerobic Fixed Bed Anfb Reactor

**IM Harris**



## **Degradation Of Whey In An Anaerobic Fixed Bed Anfb Reactor:**

**Degradation of Whey in an Anaerobic Fixed Bed (AnFB) Reactor** Marisa Handajani, 2004      **Degradation of Whey in an Anaerobic Fixed Bed (AnFB) Reactor**, 2004 An Anaerobic Fixed Bed AnFB reactor was run as an upflow anaerobic reactor with an arrangement of supporting material for growth of a biofilm The supporting material was made from Liapor clay polyethylene sinter lamellas Herding Co Amberg The AnFB reactor was used for treating high concentrations of whey containing wastewater Optimal operating conditions for whey treatment at a concentration of COD in the influent of around 50 g whey l<sup>-1</sup> were found for a hydraulic retention time HRT in the range of 4-8 days or an organic loading rate OLR less than 10 kg COD m<sup>-2</sup> d<sup>-1</sup> This is a higher load than normally applied in praxis reactors Accumulation of volatile fatty acids VFAs happened when the AnFB was supplied with surplus whey solution at a high OLR or when it was oxygenated VFAs were accumulated faster when the HRT was changed from 12 days to 6 days compared to a change of HRT from 6 days to 4 days However at a HRT of 6 days the accumulated VFAs were completely degraded after an adaptation period of about 5 days whereas the accumulated VFAs at a HRT of 4 days remained constant upon time and could not be degraded during further incubation The conversion process acetogenesis and methanogenesis of VFAs was influenced by the pH in the reactor Acetate and n Butyrate were converted faster at neutral or slightly alkaline pH while propionate was degraded faster at slightly acidic pH value The population in the AnFB contained hydrogen utilizing methanogenic bacteria formate utilizing methanogenic bacteria methanol utilizing methanogenic bacteria acetoclastic methanogenic bacteria and sulfate reducing bacteria as the final stage organism of whey degradation Acetogenic and methanogenic bacteria grew slower and were present at much lower numbers than acidogenic bacteria This made the acid degradation rate less than the acid production rate The minimal HRT in the whey reactor was thus dependent on acid degradation rates Acetate utilizing methanogens seemed to be unable to grow as single cells They preferred to grow in a particulate or attached manner on a support material The biofilm on the support materials provided a lower redox potential and an anaerobic environment that was obligately needed by these bacteria The addition of a reducing agent was necessary to keep the few culturing acetoclastic methanogens in suspended cultures active H<sub>2</sub> CO<sub>2</sub> was the best methanogenic substrate for the bacteria in the effluent suspension of whey reactor followed by formate and methanol The least degradable substrate in suspension cultures was acetate The optimal H<sub>2</sub> gas concentration for methanogens was provided at 2-25 bar Ferric ions addition or the addition of a mix of minerals improved acetate degradation and methane production rates more than two folds The redox potential reducing agent was low enough for methanogenesis An AnFB reactor would be a suitable means for stabilizing wastewater from dairy processing Liapor clay polyethylene sinter lamellas in a regularly arrangement could be the substratum for biofilm formation A minimum HRT of 4-6 days should be planned or a maximum OLR rate 10 kg COD m<sup>-2</sup> d<sup>-1</sup> not exceeded

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this article are the results of over three years of pilot work on generating methane gas from whey using a Hy Flo™ anaerobic fluidized bed. The effect of organic loading rate, influent substrate concentration and temperature has been examined. Energy balances show the process to be a net energy producer generating between 30.5 and 78.7 times the amount of energy required to operate the system.

**Anaerobic Degradation of Acetone in Upflow Anaerobic Sludge Bed (UASB) Reactor** S. Garnier, 1992

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In an era characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Degradation Of Whey In An Anaerobic Fixed Bed Anfb Reactor**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers attempt an enlightening odyssey, unraveling the intricate significance of language and its enduring impact on our lives. In this appraisal, we shall explore the book's central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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