

Modelling of Activated Sludge Process

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Abstract

In this report, I have used commercial matlab software for activated sludge process. Have included various types of activation process, and then done simulation of a simple fermenter and activated sludge processer used in activated sludge process included the future developments in activated sludge process.

Index terms— sludge various fermnter commercial

1 Introduction

a) Activated Sludge [18] ctivated sludge process is a highly efficient system for the aerobic biological treatment of industrial or municipal wastes. The process depends on the use of a high concentration of microorganisms in the form of floc, which is kept in suspension by agitation. Agitation is provided either by mechanical means or by aeration.

In this process, a portion of the separated sludge along with the native population of living microorganisms is added to the incoming effluent as inoculums. This added sludge is often referred to as activated sludge and carries out the actual oxidation. Thus, a constant microbial population is maintained in the activated sludge tank.

The activated sludge tank is simple in design. It is an oblong deep tank, provided with an inlet at the top of one end and an outlet at the bottom of the other end. Aeration is provided either by an air diffuser located at the bottom of the tank or by agitators at the surface of waters along both sides of the tank.

2 Exceptions

? S_I (inert soluble organic matter) and S_{ALK} (total alkalinity) are not included.

? The inert (X_{I,IAWQ}) and particulate (X_{P,IAWQ}) matter are combined into one variable Hence X_I = X_{I,IAWQ} + X_{P,IAWQ}.

? (S_O) dissolved oxygen describes the oxygen transfer.

? K_L a is the oxygen transfer function

? u is the airflow rate

? S_{O,sat} is the saturated dissolved oxygen concentration.

3 Parameters [19]

? S_{NH(t)} soluble ammonium nitrogen IV.

4 Results of Simulation

5 Conclusion

1. The pilot plant has been a very fruitful tool in studying various aspects of the activated sludge process, ranging from innovative operating modes microbiological studies to advanced control and estimation schemes. 2. New methods have been easy and inexpensive to test. It is, however, important to observe that the operation of a pilot plant with an extensive instrumentation is quite demanding in terms of maintenance. 3. The results from the pilot plant studies have given important guidelines for full scale plant design and operation.

4. The developed control strategies show that an increased automation can lead to energy savings and reduced consumption of chemicals. 5. The simulation model has been a very useful tool for evaluation of all the different controllers and control strategies.



Figure 1: o 1 o

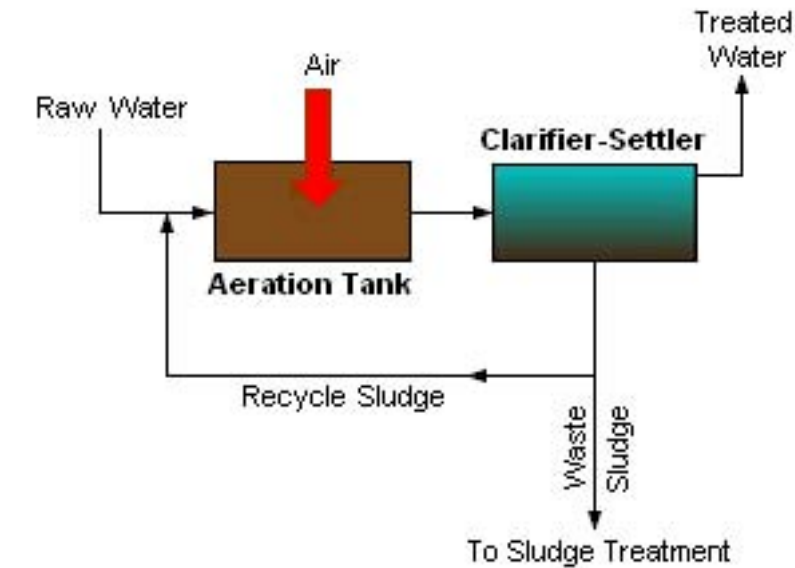


Figure 2: 6 .

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Figure 3: C

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- 45 [Biotechnology Advances (2001)] , *Biotechnology Advances* 1 April 2001. 19 (2) p. .
- 46 [Science and Technology ()] , *Science and Technology* 2003. IWA Publishing. 47 p. .
- 47 [Exman et al.] *Adaptive control of nitrate level in an activated sludge process*, P Exman , B Samuelsson , Carlsson
- 48 .
- 49 [krist v. Gernaey, sten. B. Jorgensen ()] ‘Benchmarking combined biological phosphorous and nitrogen removal
- 50 waste water treatment processes’. *Control Engineering Practice* krist v. Gernaey, sten. B. Jorgensen (ed.)
- 51 2004. 12 p. .
- 52 [Abusam et al. ()] ‘Benchmarking procedure for full scale activated sludge plants: a’. K J Abusam , H Keesaman
- 53 , G Spanjers , Van Straten . *Control Engineering Practice* 2004. 12 p. .
- 54 [Chemically reduced excess sludge production in the activated sludge process Chemos-phere (2003)]
- 55 *Chemically reduced excess sludge production in the activated sludge process Chemos-phere*, January
- 56 2003. 50. (Pages 1-7 YuLiu)
- 57 [Control and Estimation Strategies Applied to Activated Sludge Processes ()] *Control and Estimation Strategies*
- 58 *Applied to Activated Sludge Processes*, 1997. Carl-Fredrik Lindberg.
- 59 [Hyunook Kim, T.J. Mcavoy, J.S. Anderson, O.J.Hao ()] ‘Control of an alternating aerobic-anoxic activated
- 60 skudge system-part 2: optimization using a linerized model by’. *Control Engineering Practice* Hyunook Kim,
- 61 T.J. Mcavoy, J.S. Anderson, O.J.Hao (ed.) 2000. 8 p. .
- 62 [Dynamic kinetic model of the activated sludge process FMC Corporation] ‘Dynamic kinetic model of the acti-
- 63 vated sludge process’. *FMC Corporation*, (Santa Clara, California) p. 95052. Central Engineering Laboratories
- 64 [Yasui et al. (1996)] *FIBiol (Hon Fellow)** 11. Minimization of excess sludge production by increase of oxygen*
- 65 *concentration in activated sludge flocs*, H Yasui , K Nakamura , S Sakuma , M Iwasaki , Y ; P F Cooper ,
- 66 Btech , Msc , Ceng , (Micheme , A L Fellow)* , Downing , Feng , Dsc , Ma , Ficheme Bsc . 1996. 1 January
- 67 2000. 34 p. . (Sakai 10. Milestones in the Development of the Activated-Sludge Process Over the Past y,
- 68 Eighty Years (Abridged). Pages 139-146 B. Abbassi, S. Dullstein, N. Rübiger)