Kinetika degradasi substrat dalam Microbial Desalination Cell (MDC) 3 chamber = Kinetic of substrate degradation in microbial desalination cell (MDC) 3 chamber

Riza Zulkarnain, author

Abstrak

[ABSTRAK<br
Microbial Desalination Cell (MDC) 3 Chamber merupakan salah satu teknologi desalinasi yang tidak memerlukan listrik dalam menjalankan desalinasi. Namun, lamanya waktu desalinasi dan rendahnya salt removal yang dihasilkan masih menjadi kendala. Penelitian dilakukan dengan menguji coba penggunaan Debaryomyces hansenii ke MDC 3 Chamber yang baru dengan rasio volume anoda : volume garam : volume katoda yaitu 2:1:2 dan 9:1:9 dan substrat yaitu glukosa serta larutan NaCl awal 30 g/L. Variasi yang digunakan dalam penelitian yaitu rasio kultur terhadap substrat dan kenaikan volume kultur dan substrat. Untuk masing-masing MDC 3 chamber, dilakukan pengukuran salinitas dan tegangan listrik tiap jam. Data kemudian diolah untuk mendapatkan nilai salt removal sedangkan estimasi parameter kinetika Monod yaitu Pmax dan KS menggunakan Solver. Hasil penelitian menujukkan bahwa pada kondisi optimum MDC 3 chamber yaitu pada kenaikan volume kultur dan substrat sebesar 1,5 kali dengan menggunakan Debaryomyces hansenii terbukti efektif dan cukup cepat dalam menurunkan salinitas (salt removal) yaitu 55,03 % pada jam ke-40 untuk rasio volume chamber 9:1:9 dan 30, 55 % pada jam ke-25. untuk rasio volume chamber 2:1:2. Besarnya konsentrasi awal substrat yang digunakan berpengaruh pada densitas daya yang dihasilkan. Persamaan Monod untuk kinetika MDC 3 chamber dapat diaplikasikan dengan baik pada MDC 3 chamber rasio volume chamber 2:1:2 Saccharomyces cerevisiae dan MDC 2:1:2 - Debaryomyces hansenii dengan nilai Pmax dan KS yaitu 0,103 W/m3 ; 1,13 x 104 mg/L ; 0,151 W/m3 ; 1,09 x 105 mg/L. Namun, persamaan Monod tidak dapat diaplikasikan untuk MDC 3 chamber rasio volume 9:1:9 - Debaryomyces hansenii.
<hr>
ABSTRACT
Microbial Desalination Cell (MDC) 3 Chamber is one of the desalination technology that does not require electricity to run desalination. However, the length of time for desalination and low of salt removal still a constraint. The study was conducted with the use of Debaryomyces hansenii tested to MDC 3 new Chamber with anode volume ratio: the volume of salt: the volume of 2:1:2 and 9:1:9 cathode and the substrate is glucose and initial NaCl 30 g / L. Variation used in the study of culture to substrate ratio and the increase in the volume of the culture and the substrate. For each of the 3 chamber MDC, salinity measurements and the power supply voltage were taken every hour. The data is then processed to obtain salt removal while estimates of the value of the Monod kinetic parameters, namely Pmax and KS using Solver. The results showed that the optimum conditions MDC 3 chamber culture is on the rise and substrate volume of 1.5 times using Debaryomyces hansenii proven effective and fast enough to lower the salinity (salt removal) is 55.03% at the 40th hour for the ratio chamber volume 9:1:9 and 30, 55% at the 25th hour. to chamber volume ratio 2:1:2. The magnitude of the initial concentration of the substrate that is used affects the generated power density. Monod equation to the kinetics of MDC 3 chamber can be applied to both the

MDC 3 chamber volume ratio 2:1:2 Saccharomyces cerevisiae and MDC 2:1:2 - Debaryomyces hansenii and Pmax value is 0.103 W/m3 ; KS; 1.13 x 104 mg/L ; 0.151 W/m3 ; 1.09 x 105 mg/L. However, the Monod equation can not be applied to MDC 3-chamber volume ratio 9:1:9 - Debaryomyces hansenii., Microbial Desalination Cell (MDC) 3 Chamber is one of the desalination technology that does not require electricity to run desalination. However, the length of time for desalination and low of salt removal still a constraint. The study was conducted with the use of Debaryomyces hansenii tested to MDC 3 new Chamber with anode volume ratio: the volume of salt: the volume of 2:1:2 and 9:1:9 cathode and the substrate is glucose and initial NaCl 30 g / L. Variation used in the study of culture to substrate ratio and the increase in the volume of the culture and the substrate. For each of the 3 chamber MDC, salinity measurements and the power supply voltage were taken every hour. The data is then processed to obtain salt removal while estimates of the value of the Monod kinetic parameters, namely Pmax and KS using Solver. The results showed that the optimum conditions MDC 3 chamber culture is on the rise and substrate volume of 1.5 times using Debaryomyces hansenii proven effective and fast enough to lower the salinity (salt removal) is 55.03% at the 40th hour for the ratio chamber volume 9:1:9 and 30, 55% at the 25th hour. to chamber volume ratio 2:1:2. The magnitude of the initial concentration of the substrate that is used affects the generated power density. Monod equation to the kinetics of MDC 3 chamber can be applied to both the MDC 3 chamber volume ratio 2:1:2 Saccharomyces cerevisiae and MDC 2:1:2 - Debaryomyces hansenii and Pmax value is 0.103 W/m3 ; KS; 1.13 x 104 mg/L ; 0.151 W/m3 ; 1.09 x 105 mg/L. However, the Monod equation can not be applied to MDC 3-chamber volume ratio 9:1:9 - Debaryomyces hansenii.]