Evaluasi pH awal media dalam biofiltrasi N2O pada karbon aktif yang diinokulasi oleh nitrobacter winogradskyi = Evaluation of initial medium pH in N2O biofiltration on the activated carbon inoculated by nitrobacetr winogradskyi

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Abstrak

Gas dinitrogen monoksida (N2O)merupakan salah satu gas polutan yang berkontribusi besar terhadap pemanasan global dampak gas rumah kaca.Metode biofilter digunakan sebagai salah satu alternatif pengolahan gas buang secara biologis. Penelitian dilakukan untuk mengevaluasi pengaruh variasi pH awal media terhadap reduksi gas N2O dan pertumbuhan mikroba dalam media filter. Penelitian ini menggunakan peralatan berskala laboratorium pada proses biofiltrasi gas N2O oleh mikroorganisme Nitrobacter winogradskyi menggunakan media filter berupa karbon aktif. Penelitian dilakukan dengan laju alir N2O sebesar 88 cc/menit dengan sistem batch selama 24 jam. Analisa biofiltrasi dilakukan terhadap efisiensi reduksi gas N2O menggunakan Gas Chromatography (GC). RE (Removal Efficiency) paling baik dicapai pada pH awal media 7 sebesar 93,8%. Penghitungan koloni mikroba dilakukan dengan metode TPC(Total Plate Count) dan SEM (Scanning Electron Microscope). Koloni mikroba paling sedikit berkurang pada pH awal media 7 setelah biofilter dibandingkan variasi pH lainnya.Proses biosorpsi karbon aktif memiliki kemampuan reduksi N2O yang lebih baik dibandingkan dengan proses adsorpsi.Kemampuan adsorpsi karbon aktif sebagai medium filter dengan dan tanpa adanya bakteri pendegradasi direpsentasikan dengan persamaan Langmuir dan Freundlich. Peforma biofiltrasi dalam mereduksi gas N2O hasilnya baik dilakukan dengan menggunakan media filter karbon aktif maupun dengan zeolit alam.
.....Dinitrogen monoxide gas (N2O) is one of the pollutant gases tahta contribute greatly to global warming effect greenhouse gases. Biofilter method used as an alternative biological waste gas treatment. This study was conducted to evaluated the effect of variation initial medium pH of N2O gas reduction and growth of microba in filter medium. This study used a laboratory-scale equipment to process N2O gas biofiltration use activated carbon as filter medium inoculated by microorganism N. winogradskyi. The study was conducted with N2O flow rate of 88cc/min with a batch system for 24 hours. Biofiltration analysis conducucted on the removal efficiency (RE) of N2O gas using GC (Gas Chromatography). Biofiltrasi analysis conducted on the efficiency of the reduction of N2O gas using Gas Chromatography (GC). RE (Removal Efficiency) is best achieved at pH 7 for 93.8% of the initial media. Microbial colony counting was conducted by TPC (Total Plate Count) and SEM (Scanning Electron Microscope). Microbial colonies at least reduced at pH 7 after the initial medium biofilter compared other pH variations. Biosorpsi process of activated carbon has the ability to better N2O reduction compared with the adsorption process. Adsorption capacity of activated carbon as filter medium with and without degrading bacteria repsented with Langmuir and Freundlich equations.Overall both of biofiltration N2O gas using activated carbon and natural zeolite, has a good capability as filter medium.