Pengaruh konsentrasi H2O2 dan laju alir gas umpan terhadap proses penyisihan gas buang mesin diesel melalui membran serat berongga = The effect of concentration of H2O2 and feed gas flow rate on removal of diesel engine exhaust through hollow fiber membrane

Muhamad Fadlan Rasyid, author

Abstrak

Beberapa polutan udara yang mencemari lingkungan antara lain seperti nitrogen oksida (NOx), sulfur dioksida (SO2), dan karbon monoksida (CO). Teknologi kontaktor membran merupakan teknologi alternatif dalam menyisihkan gas NOx, SO2, dan CO karena keunggulannya berupa luas area spesifik yang tinggi. Penelitian ini akan mempelajari proses penyisihan gas buang mesin diesel berupa NOx, SO2, dan CO menggunakan pelarut H2O2 dan NaOH pada modul membran serat berongga berbahan polisulfon. Gas buang mesin diesel akan dialirkan pada bagian tube membran, sedangkan pelarut H2O2 dan NaOH berada di bagian shell dan bersifat statis. Variabel bebas yang diuji pada penelitian ini adalah laju alir gas umpan dan konsentrasi pelarut H2O2. Berdasarkan hasil uji, efisiensi penyisihan gas NOx, SO2, dan CO tertinggi pada laju alir gas 100 mL/menit dan konsentrasi H2O2 0,5 M berturut-turut, yaitu sebesar 99,56%, 99,79%, dan 99,28%, fluks perpindahan massa NOx, SO2, dan CO tertinggi pada laju alir gas 200 mL/menit menit dan konsentrasi H2O2 0,5 M berturut-turut, yaitu sebesar 1,13 x 10-6 mmol/cm2.s, 9,42 x 10-7 mmol/cm2.s, dan 8,93 x 10-7 mmol/cm2.s serta NOx, SO2, dan CO loading tertinggi pada laju alir gas 200 mL/menit menit dan konsentrasi H2O2 0,05 M berturut-turut, yaitu sebesar 1,72 x 10-4 mmol NOx/mmol H2O2.s, 1,3 x 10-4 mmol SO2/mmol H2O2.s, dan 1,2 x 10-4 mmol CO/mmol H2O2.s.

.....Some air pollutants that affect the environment include nitrogen oxides (NOx), sulfur dioxide (SO2), and carbon monoxide (CO). Membrane contactor technology is an alternative technology in NOx, SO2, and CO gases because of its advantages, such as high specific area. This study investigates removing exhaust gases from diesel engines in the form of NOx, SO2, and CO using H2O2 and NaOH solvents on hollow fiber membrane modules made of polysulfone. The exhaust gas of the diesel engine will be in the membrane part of the tube, while the solvent H2O2 and NaOH are in the shell and are static. The independent variables tested in this study were the gas feed flow rate and the concentration of H2O2. Test results, the highest absorption efficiency of NOx, SO2, and CO gas was at a gas flow rate of 100 mL/min and H2O2 0.5 M, respectively, which are 99.56%, 99.79%, and 99.28%, the highest mass transfer flux of NOx, SO2, and CO at a gas flow rate of 100 mL/min and H2O2 0.5 M, respectively, namely 1.13 x 10-6 mmol/cm2.s, 9.42 x 10-7 mmol/cm2.s, and 8.93 x 10-7 mmol/cm2.s, and also highest NOx, SO2, and CO loading at a gas flow rate of 100 mL/min and H2O2 0.05 M, respectively, namely 1.72 x 10-4 mmol NOx/mmol H2O2.s, 1.3 x 10-4 mmol SO2/mmol H2O2.s, and 1.2 x 10-4 mmol CO/mmol H2O2.s.