

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

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Abstrak

Beberapa polutan udara yang mencemari lingkungan antara lain seperti nitrogen oksida (NO_x), sulfur dioksida (SO₂), dan karbon monoksida (CO). Teknologi kontaktor membran merupakan teknologi alternatif dalam menyisihkan gas NO_x, SO₂, dan CO karena keunggulannya berupa luas area spesifik yang tinggi. Penelitian ini akan mempelajari proses penyisihan gas buang mesin diesel berupa NO_x, 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 NO_x, 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 NO_x, SO₂, dan CO tertinggi pada laju alir gas 200 mL/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 NO_x, SO₂, dan CO loading tertinggi pada laju alir gas 200 mL/menit dan konsentrasi H₂O₂ 0,05 M berturut-turut, yaitu sebesar 1,72 x 10⁻⁴ mmol NO_x/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 (NO_x), sulfur dioxide (SO₂), and carbon monoxide (CO). Membrane contactor technology is an alternative technology in NO_x, 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 NO_x, 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 NO_x, 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 NO_x, 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 NO_x, 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 NO_x/mmol H₂O₂.s, 1.3 x 10⁻⁴ mmol SO₂/mmol H₂O₂.s, and 1.2 x 10⁻⁴ mmol CO/mmol H₂O₂.s.