

Pengaruh TiO₂ sebagai fotokatalisator pada kinetika penguraian limbah cair minyak bumi studi kasus: PT Pertamina (Persero) RU Plaju, Sumatera Selatan = Effect of TiO₂ as photocatalyst to kinetic of petroleum refinery wastewater decomposition case study: PT Pertamina Persero RU III Plaju, Sumatera Selatan

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Abstrak

[ABSTRAK

Meningkatnya air limbah minyak bumi, maka diperlukan pengolahan yang baik. Proses fotolisis merupakan pengolahan yang tepat dan penambahan katalis TiO₂ untuk mempercepat prosesnya. Objek studi penelitian ini adalah Air limbah produksi minyak bumi dan gas pada Instalasi Pengolahan Air Limbah (IPAL) di PT. Pertamina (Persero) RU III, Plaju, Sumatera Selatan. Penelitian eksperimental dilakukan pada skala laboratorium. Proses ini dilakukan dengan menyinari sampel air limbah dengan lampu UV dan ditambahkan katalis TiO₂. Katalis TiO₂ memiliki ukuran partikel hingga mencapai 5 μm, tingkat disperse rendah, dan tingkat kemurnian 100%. Air limbah produksi memiliki debit 40 m³/jam dengan kualitas influen rata-rata COD 1035,7 mg/l; Fenol 246,6 mg/l; Suhu 28,8oC; pH 8,95; Amonia 0,076 mg/l; Sulfida 246,6 mg/l; dan tidak terkandung Minyak dan Lemak didalamnya. Variasi yang dilakukan pada penelitian ini dosis katalis, waktu kontak, dan pH. Konstanta degradasi COD pada hubungan waktu kontak terhadap removal COD yaitu $k = 0,0074 \text{ min}^{-1}$ pada pH 4. Kondisi optimum pengolahan berada pada pH 4, dosis optimum 100,8 ppm, dan waktu kontak 150 menit mencapai removal 69,154%.

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ABSTRACT

The increase of petroleum wastewater needs the better treatment. Photolysis is the proper processing with catalyst TiO₂ to accelerate the process. The object study is Wastewater of Oil and gas Refinery Production at Waste Water Treatment Plant (WWTP) at PT. Pertamina (Persero) RU III, Plaju, South Sumatera. This experimental research conducted in laboratory scale. This process is carried out by irradiating the sample by UV rays which has been added TiO₂ catalyst. The size of catalyst TiO₂ is up to 5 μm, has low disperse, and 100% purity. Wastewater discharge production has 40 m³/day with the quality of influent COD 1035.7 mg/l, Phenol 246.6 mg/l, Temperature 28.8oC, pH 8.95, Ammonia 0.076 mg/l, Sulfide 246.6 mg/l, and there wasn't oil in it. This process is carried out by irradiating the sample by UV rays which has been previously added TiO₂ catalyst. Variations to be conducted in this study is the catalyst dosage, contact time, and pH. The constant degradation of COD on the

relationship of time contact against the removal of COD that is $k = 0.0074 \text{ min}^{-1}$ at pH 4. Treatment optimum condition at pH 4, catalyst dosage 100,8 ppm, and contact time 150 minutes has reached 69.154% of COD removal; The increase of petroleum wastewater needs the better treatment.

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