Studi Pengaruh Jumlah Ti3+ pada TiO2 Nanotube Terdekorasi Nanopartikel Emas (AuNp) sebagai Katalis Reaksi Konversi Nitrogen Menjadi Amonia = Study of the effect the amount of Ti3 + on TiO2 Nanotubes Decorated with Gold Nanoparticles as Catalysts for Nitrogen Conversion to Ammonia

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Abstrak

Amonia merupakan bahan kimia yang penting dan banyak digunakan dalam berbagai proses industri kimia. Amonia diproduksi dalam skala industri melalui proses Haber-Bosch. Dalam proses tersebut gas H2 dan N2.direaksikan pada suhu dan tekanan tinggi, serta menggunakan hidrokarbon dari minyak bumi sebagai sumber protonnya. Dalam penelitian ini, sintesis NH3 dilakukan secara fotokatalitik, dalam tekanan dan suhu ruang, menggunakan gas nitrogen dan sumber proton dari air. Pada penelitian sebelumnya digunakan fotokatalis TiO2 yang diperkaya dengan spesi Ti3+ yang disiapkan secara elektrokimia. Pada penelitian ini dilakukan pengembangan matrik sistem Ti3+ TiO2 nanotube, dengan upaya meningkatkan populasi spesi Ti3+9 dan menedekorasinya dengan nano partikel emas. Sistem fotokatalis Au/Ti3+/TiO2NT yang dihasilkan saat direndam dalam larutan 0,1 M Na2SO4 dan dialiri gas N2, serta disinari dengan sinar tampak menghasilkan NH3, dengan konversi sinar ke produk ammonia sebesar 0.026%.
.....Ammonia (NH3) is an important chemical and is widely used in various industrial processes. Ammonia production in an industrial scale is conducted through the Haber-Bosch process, where in this process H2 and N2 gases are reacted in a high temperatures and pressures. In addition, in that process the hydrocarbon was used as proton precursor. In this research, the photocatalytic method of producing NH3 from water, as proton source, and N2 at atmospheric pressure and room temperature is being investigated. In the previous study, it was reported that a specific enriched TiO2 semiconductor material with Ti3 + showed its potential to photocatalytically conver nitrogen to ammonia, under UV irradiation. In this study, the photocatalyst matrix was improved by increasing the Ti3 + species population and decorating with gold nanoparticle. The resulted photocatalyst system, namely Au / Ti3 + / TiO2-NT, then was immersed in 0.1M of Na2SO4 solution, under N2 bubbling, and exposed by visible light, and consistently ammonia productions were observed. In the present condition an efficientcy of solar to ammonia production was approximately 0.026% .