Pengaruh konversi bentuk nanopartikel perak melalui pemanasan dan fotoinduksi terhadap aktivitas katalitik reduksi 4-nitrofenol = Effect of shape conversion of silver nanoparticle by heating and photoinduction for catalytic activity of reduction 4-nitrophenol / Harits Atika Ariyanta

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Abstrak

[ABSTRAK
Konversi bentuk nanopartikel perak (AgNP) melalui pemanasan dan fotoinduksi terjadi dengan kehadiran sitrat sebagai capping agent dan polivinilpirolidone (PVP) sebagai stabilisator. Awalnya, assintesis nanoprisma perak (AgNP-Biru) dipanaskan selama 30 menit hingga terbentuk nanodisk perak (AgNP-Kuning). Selanjutnya, di bawah penyinaran lampu natrium nanoprisma perak(AgNP-Iradiasi) kembali terbentuk dengan ukuran yang lebih besar. Spektrofotometer UV-Vis dan transmission electron microscopy (TEM) digunakan untuk investigasi pertumbuhan dan konversi bentuk AgNP. Hasil penelitian menunjukkan bahwa parameter kisi AgNP-orange (4.0716 Å) lebih kecil dari AgNP-Iradiasi (4.3134 Å). Hal tersebut mengindikasikan terjadinya rearrangement atom perak pada permukaan AgNP. AgNP dengan bentuk bulat dan triangular diuji akivitas katalitiknya sebagai katalis homogen dan heterogen untuk reduksi 4-nitrofenol. Sebagai katalis heterogen, AgNP diimobilisasi dalam karbon aktif dan dikarakterisasi menggunakan SEM-EDX. Aktivitas katalitik AgNP-Iradiasi lebih aktif daripada AgNP-Orange. Konstanta kinetika reaksi pseudo orde satu reduksi 4-NP dengan NaBH4 adalah 0.2178 s-1 (katalis homogen) dan 0.2225 s-1 (katalis heterogen).
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ABSTRACT
Heated and Photoinduced shape conversion of silver nanoparticles (AgNPs) were occurred in the presence of citrate as capping agent and polyvinylpyrrolidone (PVP) as additional stabilizer. First, the as-synthesized silver nanoprism (AgNP-Blue) were heated to transformed into silver nanodisks (AgNP-Orange) with time. Subsequently, under light irradiation (sodium lamp), an increasing fraction of silver nanoprism (AgNP-Irradiation) develop. The UV-Vis spectrophotometer and transmission electron microscopy (TEM) were adopted to investigate the growth and shape conversion of AgNPs. The result show that the lattice constant of AgNP-Orange converted by heating (4.0716 Å) less than AgNP-Irradiarion (4.3134 Å), which was possibly achieved through rearrangement of silver atoms on the surface of AgNPs. Both silver nanodisk and nanoprism were tested as homogenous and heterogeneous catalyst for reduction of 4-nitrophenol (4-NP). AgNPs supported on activated carbon were synthesized as heterogen catalyst and characterized by SEM-EDX. For catalytic application, AgNP-Irradiation were more actived than AgNP-orange. The kinetic constants of pseudo first orde reaction of reduction 4-NP with NaBH4 are 0.2178 s-1 for homogeneous and 0.2225 s-1 for heterogeneous catalyst, Heated and Photoinduced shape conversion of silver nanoparticles (AgNPs) were occurred in the presence of citrate as capping agent and polyvinylpyrrolidone (PVP) as additional stabilizer. First, the as-synthesized silver nanoprism (AgNP-Blue) were heated to transformed into silver nanodisks (AgNP-Orange) with time. Subsequently, under light irradiation (sodium lamp), an increasing fraction of silver nanoprism (AgNP-Irradiation) develop. The UV-Vis spectrophotometer and

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