

Sintesis Katalis PtNiCo/CNS dan PtNiCoAg/CNS untuk Reaksi Dehidrogenasi Hidrazin Hidrat = Synthesis of PtNiCo/CNS and PtNiCoAg/CNS Catalysts for Hydrazine Hydrate Dehydrogenation Reaction

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Abstrak

Pengembangan energi berbasis hidrogen dilakukan untuk menggantikan energi konvensional yang tidak ramah lingkungan. Senyawa penyimpan hidrogen, hidrazin hidrat ($\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$) dapat menghasilkan hidrogen dengan produk samping N_2 melalui reaksi dekomposisinya. Katalis PtNi, PtCo, NiCo, PtNiCo, dan PtNiCoAg dengan pendukung karbon nanosphere (CNS) disintesis melalui proses impregnasi basah dan dikarakterisasi dengan XRD, XRF, SAA, FESEM-EDX, dan TEM. Pengaruh dari variasi komposisi logam, suhu, NaOH, dan keberulangan pemakaiannya dievaluasi dan dipelajari terhadap aktivitas dan selektivitas katalitik. Katalis trimetalik Pt_{0,2}Ni_{0,2}Co_{0,6}/CNS memiliki aktivitas katalitik tertinggi dengan penambahan 2 mmol NaOH pada suhu 343 K dengan nilai TOF 757,34 h⁻¹, selektivitas 62,82%, dan energi aktivasi 35,226 kJ/mol yang menunjukkan efek sinergis dari logam Pt, Ni, dan Co pada pendukung karbon nanosphere.

.....The development of hydrogen-based energy is carried out to replace conventional energy which is not environmentally friendly. The hydrogen storage compound, hydrazine hydrate ($\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$) can produce hydrogen with N_2 as a by-product through its decomposition reaction. PtNi, PtCo, NiCo, PtNiCo, and PtNiCoAg catalysts with carbon nanospheres (CNS) support were synthesized via wet impregnation process and characterized by XRD, XRF, SAA, FESEM-EDX, and TEM. The effects of variations in metal composition, temperature, NaOH, and reusability were evaluated and studied on catalytic activity and selectivity. The trimetallic catalyst Pt_{0.2}Ni_{0.2}Co_{0.6}/CNS had the highest catalytic activity with the addition of 2 mmol NaOH at 343 K with a TOF value of 757.34 h⁻¹, a selectivity of 62.82%, and an activation energy of 35.226 kJ/mol which shows the effect synergy of Pt, Ni, and Co metals on the carbon nanospheres support.