Sintesis Katalis Bimetalik RuX/CNS (X = Ni, Fe, Ag) untuk Reaksi Dehidrogenasi Amonia Boran = Synthesis Catalyst Bimetallic RuX/CNS (X = Ni, Fe, Ag) for Ammonia Borane Dehydrogenation Reaction

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Abstrak

Energi hidrogen merupakan salah satu alternatif energi terbarukan yang ramah lingkungan. Hidrogen dapat diproduksi dengan berbagai macam metode salah satunya adalah dehidrogenasi amonia boran. Amonia boran memiliki karakteristik seperti stabilitas di udara dan air, kandungan hidrogen yang tinggi sekitar 19.6 wt% yang pada reaksinya akan terbentuk 3 mol hidrogen. Katalis RuX (X = Ni, Fe, Ag) dengan pendukung karbon nanosphere (CNS) disintesis dengan metode impregnasi basah dan dikarakterisasi dengan TEM, SAA, XRD dan XRF. Pengaruh dari penambahan logam X, variasi suhu, konsentrasi NaOH, dan keberulangan pemakaiannya dievaluasi dan dipelajari terhadap aktivitas katalitik. Kartalis bimetalik RuNi memiliki aktivitas katalitik tertinggi dengan penambahan NaOH 1 M yang menghasilkan nilai TOF 3481,9 h-1 dan energi aktivasi 23,054 kJ/mol yang menunjukkan adanya efek sinergis antara logam Ru dan Ni pada pendukung karbon nanosphere.

.....Hydrogen energy is one of the environmentally friendly renewable energy alternatives. Hydrogen can be produced by various methods, one of which is the dehydrogenation of ammonia borane. Ammonia borane has characteristics such as stability in air and water, a high hydrogen content of about (19.6 wt%) which in the reaction will form 3 moles of hydrogen. RuX catalyst (X = Ni, Fe, Ag) with carbon nanosphere (CNS) support was synthesized by wet impregnation method and characterized by TEM, SAA, XRD and XRF. The effect of addition of metal X, variations in temperature, concentration of NaOH, and its sustainability were evaluated and studied on catalytic activity. The RuNi bimetallic catalyst had the highest catalytic activity with the addition of 1 M NaOH which resulted in a TOF value of 3481.9 h-1 and an activation energy of 23.054 kJ/mol indicating a synergistic effect between Ru and Ni metals on the carbon nanosphere support.