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# GENERATION OF HYDROGEN BY CORROSION OF NEW NANOCOMPOSITE BASED ON ALUMINUM IN DILUTED ALKALINE SOLUTION

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## ABSTRACT

The aim of this paperwas to fabricate Al matrix composites with 0-10 wt. % $TiO_2$ nanoparticles ($TiO_2$-NPs) and examine their hydrogen generation properties from the hydrolysis of Al in 0.05M NaOH solution at room temperature. XRD, SEM, TEM and EDX techniques were used to study the structure properties of the nanocomposites before and after hydrolysis process. Powder metallurgy technology has been followed to fabricate the nanocomposite samples. Hydrolysis results exhibit a maximum hydrogen generation rate of about 20 ml $min^{-1}$ $g^{-1}$ for 5 wt. % $NiO_2$-NP/Al composite which is higher than that of Al without $TiO_2$-NP due to the synergetic effect of the porous Al matrix, which has a large reaction area and galvanic corrosion between the Al matrix and the $TiO_2$-NPs. SEM photographs confirmed the homogeneity of the nanocomposites microstructure except for 10 wt. $TiO_2$-Nps/Al composite since the $TiO_2$-Nps are not well distributed through the Al matrix but accumulated in isolated regions leading to produce composites with less porous structure and less Al surface area subjected to the alkaline solution that leading to lower hydrogen generation rate comparing to 5 wt.% $TiO_2$-NP/Al composite.

**KEYWORDS*:*** hydrogen generation Reaction, Metal Matrix nanocomposites, Aluminum, Titania nanoparticles