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參展科別 化學

作品名稱 **Studies of Hydrogen Evolution Reactions from Aluminum Foil using Waste Materials and Their Reaction Mechanism**

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Abstract

Nowadays, the most of waste materials are incinerated and generated the toxic gases in Japan. On the other hand, the Hydrogen gas (H2) has attracted attention as clean energy due to no emissions of toxic gases. In this work, we investigated that the new hydrogen evolution system using waste materials, such as aluminum (Al) foil and lime desiccant, and also investigated their reaction mechanism.

The grinded desiccant was added to Erlenmeyer flask containing 300 mL of water. After dissolution the desiccant, the Al foil was added to the solution to begin the reaction. Generated gas was determined by water displacement method. The gas components are identified by gas chromatography.

We found that the waste material reaction combined with waste lime desiccant and Al foil could be used for one of the hydrogen evolution system. This reaction is depended on solubility of lime desiccant, thus mean solubility of CaO in water. The Al foil is reacted with the desiccant more than 20 times of reaction stoichiometry. The calcium ion or calcium complex ions are involved with the excess reaction of Al foil.

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In this research, the students generated hydrogen, a clean energy resource, by using waste aluminum foil and lime desiccant. The idea is innovative and make the world more sustainable. The results showed that aluminum foil works better than the lime desiccant. The understanding of the amount of hydrogen generation is a little bit confusing because it should be expected that more hydrogen is generated upon the addition of more aluminum foil even in the same amount of CaO. The students should look into this analysis again and tried to obtain a better conclusion. In general, the idea is unique, the experiment designs are adequate and the results are promising.