

**Design of Hydrogen Reactor Based on Decomposition of Water by
Aluminium as an Alternative to Gas Fuel**

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ABSTRACT

Hydrogen is the most abundant element in the universe and is a source of energy obtained through several processes which one is decomposition of water by aluminium. This reaction assisted by NaOH as a binder layer of aluminium oxide on the surface of the aluminum so that the aluminum dissolved with the solution. This research was conducted to design a hydrogen reactor with a semi-continuous flow system where this system can produce hydrogen gas by refilling aluminium and removing wasted periodically without affecting the produced hydrogen gas. The gas produced by designed device is used as fuel on the gas stove, and compared with gas stoves fueled with LPG. The design of a hydrogen reactor is using Autodesk Fusion 360 software, and the selection of the right material is also done so that the reactor is not affected by the corrosive nature of NaOH. The hydrogen reactor is consist of several main parts including the reactor made of glass, reservoir, inlet and bubbler made from PVC, and gas storage tubes with iron plate material. The reactor performance testing is done by reacting two variations of materials including aluminum waste cans and aluminum foil. Testing using 30 grams of aluminum waste cans produced total hydrogen gas per test, which is 24 liters; 15 liters; and 8 liters, while testing using 36.54 grams of aluminum foil produced a total of 49 liters of hydrogen gas. The power produced by hydrogen powered stove ranges from 1.02-1.11 kW with a maximum efficiency of 66.02%, while the LPG powered stove ranges from 1.18-1.27 kW with efficiency a maximum of 80.13%.

Keywords: *Hydrogen reactor, aluminium, stove.*