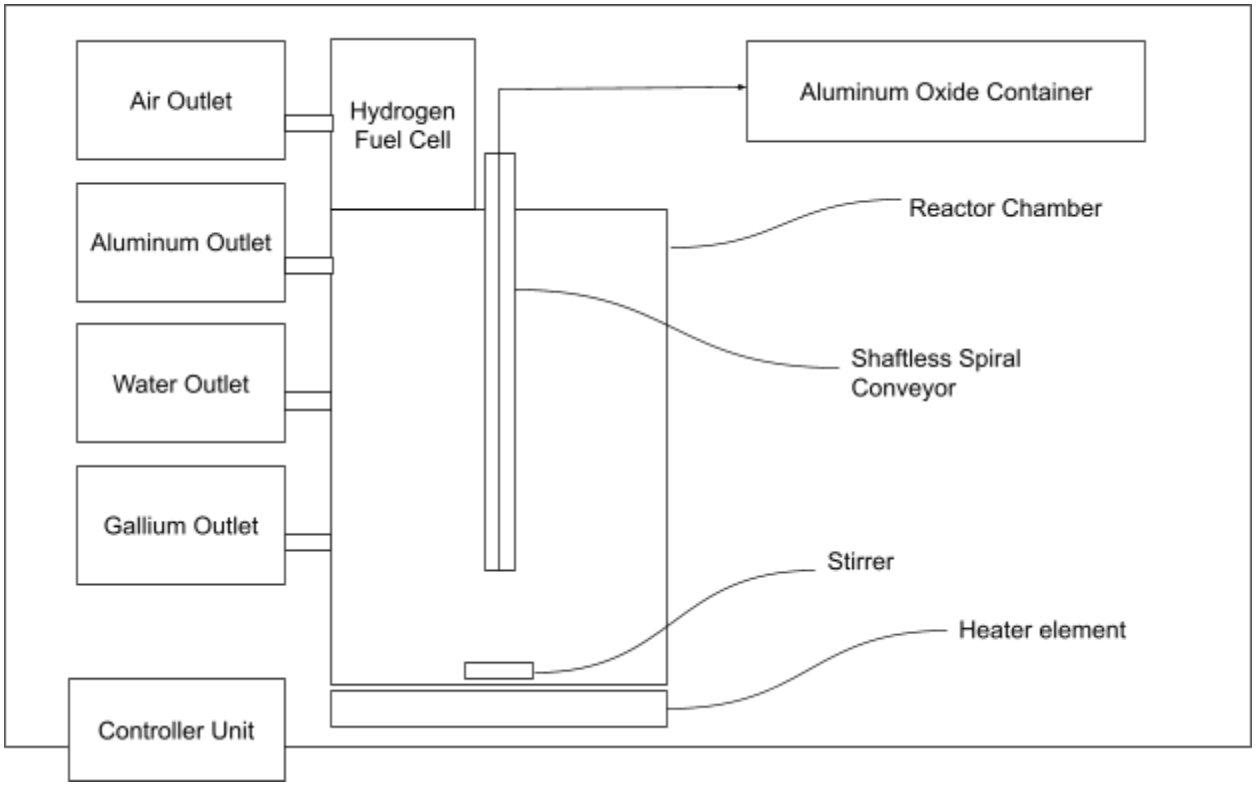
Title: Aluminum Gallium Water Reactor V3
Author: Timo Kauppila

Abstract:
This public disclosure discloses a novel reactor design specifically engineered for the controlled chemical reaction between aluminum and water in the presence of gallium, resulting in the generation of hydrogen gas and aluminum oxide. A central feature of this reactor design is a mechanical stirrer strategically positioned at the core, effectively pushing the gallium towards the reactor's perimeter through centrifugal forces. This motion ensures the continuous and uniform mixing of aluminum, water, and gallium, facilitating the desired chemical reaction. Additionally, a specialized mechanism, represented as a shaftless spiral conveyor (ribbon conveyor), is integrated into the reactor's central region, efficiently extracting the produced aluminum oxide from the reaction mixture using a lifting screw motion, and placing it into a separate container for aluminum oxide. Aluminum and water outlets are positioned to deposit aluminum and water to the periphery of the reactor chamber, where the gallium is located. A gallium outlet allows for the replenishment of the gallium inside of the reactor. The Hydrogen produced from the reaction is directed towards a hydrogen fuel cell where it combines with outside air to produce water and electricity. The water is then redirected back into the reactor chamber. A heater element ensures optimal temperature for the reaction to take place, making sure the solution remains above 33 degrees celsius, thus ensuring the gallium is in a liquid state (melting point of Gallium is 29.76 degrees Celsius). A controller unit adjusts the different inputs into the reaction, including the amount of aluminum, water, and gallium introduced into the reactor chamber, the speed of the stirrer and shaftless spiral conveyor, as well as the temperature of the heater element, ensuring optimal reaction conditions. The optimal ratio of Gallium to Aluminum inside the reactor is 3:1 which the controller unit tries to maintain. The reactor design presented herein offers an efficient and controllable system for the production of hydrogen gas and aluminum oxide for use in energy systems.



Claim 1: A reactor system for the controlled chemical reaction between aluminum and water in the presence of gallium, facilitating the generation of hydrogen gas and aluminum oxide, comprising:

a. A mechanical stirrer positioned at the core of the reactor vessel, designed to create centrifugal forces that push gallium towards the reactor's perimeter and ensuring continuous and uniform mixing of aluminum, water, and gallium.

b. A specialized mechanism integrated into the central region of the reactor vessel, represented as a shaftless spiral conveyor, employing a lifting screw motion, for the efficient extraction of produced aluminum oxide from the reaction mixture and its transfer into a separate aluminum oxide container.

Claim 2: The reactor system of claim 1, further comprising:

a. An aluminum outlet positioned at the periphery of the reactor chamber to deposit aluminum into the reaction mixture.

b. A water outlet positioned at the periphery of the reactor chamber to deposit water into the reaction mixture.

c. A hydrogen fuel cell connected to the reactor chamber to receive and utilize the hydrogen gas produced in the chemical reaction.

b. An air inlet connected to the hydrogen fuel cell to facilitate the combination of hydrogen gas with outside air, resulting in the production of water and electricity.

c. A water conduit connected to the hydrogen fuel cell to redirect the produced water back into the reactor chamber.

d. A controller unit that monitors and adjusts the different parameters of the reaction, ensuring optimal reaction conditions, and trying to maintain a Gallium to Aluminum ratio of 3:1 inside the reactor chamber.

Claim 3: The reactor system of claims 1 and 2, further comprising:

a. A heater element integrated into the reactor chamber to maintain and control the temperature within the reactor chamber, optimizing the chemical reaction between aluminum and water in the presence of gallium and making sure the temperature inside the reactor remains above 33 degrees celsius, thus ensuring the Gallium remains in a liquid state.

Claim 4: A method for generating hydrogen gas and aluminum oxide using the reactor system of any of the previous claims, comprising the following steps:

a. Introducing water, aluminum, and gallium into the reactor vessel.

b. Activating the mechanical stirrer to create centrifugal forces, pushing gallium towards the reactor's perimeter, ensuring continuous and uniform mixing of aluminum, water, and gallium.

c. Allowing the chemical reaction between aluminum and water in the presence of gallium to occur.

d. Extracting aluminum oxide from the reaction mixture using a shaftless spiral conveyor.

e. Directing the produced hydrogen gas to a hydrogen fuel cell to generate electricity and water.

f. Redirecting the produced water back into the reactor chamber.

g. Controlling the temperature within the reactor chamber using the heater element to optimize the chemical reaction.