

Design And Fabrication Of Drain Water Recycling

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Abstract—Drain water is defined as the flow of water from households, businesses, industries, and institutions subject to treatment plants. Providing clean water is an essential requirement for setting up and maintaining various human activities. Because of the strict environmental regulations and to minimize carbon footprints, hydrogen is considered an alternative fuel for both automotive and domestic purposes so that the drain water can produce hydrogen. Therefore, by using the flapper mechanism or filtration process, the hydrogen production from drain water, the solid particles are removed from drain water. Using the storage tank, the remaining portion of drain water is stored. The drain water from the storage tank falls on the turbine blade that helps rotate the turbine and leads to electricity generation. Turbine-generated electricity is used to perform the process of electrolysis. The production of hydrogen by water using the electrolysis method can be a simple way to achieve the production of clean hydrogen. The separation of hydrogen gas from water molecules takes place in the process of electrolysis. Hydrogen, produced by water electrolysis, is a high source of clean energy and will be stored in the storage tank and used for a further application. This process discusses the different concerns and issues related to the production of hydrogen from drain water.

Keywords— *Filtration, Electrolysis, Drain Water, Hydrogen Gas*

I. INTRODUCTION

It is necessary to maintain clean and pure water supply for human diversity. Valuable foods obtained for agricultural production from water resources via aquatic life and irrigation. Most water sources around the world are however polluted by liquid and solid waste produced by human settlements and industrial activities. As the population increases, there will be a greater burden on the resources available. A sustainability report shows current freshwater uses by either the current stage of developing or developed nations, water usage has increased by more than three times the increase in the world's population, resulting in wider public health problems, limiting economic and agricultural development and affecting a wide range of ecosystems on the contrary. Civilization waste enters water

bodies by dumping water-borne waste from domestic, industrial and invaluable sources that carry unwanted and harmful substances. The upcoming civilization, merged with rapidly advancing technology and rapidly growing economic system, results from its own activities in increasing water pollution. India, where the world's 7th largest country, covered 3.28 million square total landmass. Km, more than a billion inhabitants, 29% of whom live in urban areas. Because hydrogen gas is not found on Earth directly, it must be produced.

Tomomi Uchiyama et al [1] Laboratory experiments were carried out using the closed - loop test rig to investigate the performance of the pico - hydraulic turbine. It has been found that the hollow pico - hydraulic turbine can be used to generate electricity from sewage flowing into pipes. Natarianto Indrawan1 et al [2] This study developed and demonstrated 13 generation of electricity by co - gasifying two resources that were underused. The system of co - gasification provides a basis for the future development of small - scale generation of power to use local waste. J. Akash Nirmal Kumar et al [3] This work discusses the modification to be made to run an engine powered by hydrogen. Hydrogen can be used as an additive to a hydrocarbon fuel in internal combustion engines. Sami M Al-Aibi1 et al. [4] Several experiments were conducted in the filtration pilot plant using 14/25 sand and crushed glass media grade-2 to assess media performance and feasibility in treating different types of influences. It is capable at different operating conditions of removing other raw water impurities such as organic matter and heavy toxic metals (arsenic and cadmium). Ganesh S. Pati et al [5] Drainage Water Cleaner Machine's study. During the heavier rains, which had more volume of running water with garbage and high speed, the cleaner moved effectively. Bouazizi Nabil et al [6] The aluminum / cooper electrodes ' corrosion behavior and the electrolyte were studied

using water electrolysis to produce hydrogen. Obviously, the variation of their factors, the nature of the media reaction, including any examination of the results, shows that the current density in acid-base environments is higher. Chennouf et al [7] Experimental study of the operating parameters of alkaline water electrolysis affecting the solar hydrogen production system. Increasing temperature and concentration of electrolytes resulted in a net increase in volume flow, current intensity and useful efficiency. Therefore, at high temperature and optimal NaOH concentration, better hydrogen production is achieved. K.Vijayakumar Reddy et al [8] Hydrogen can be produced by dissociating water. Water is divided by electrolysis into its two basic species, oxygen and hydrogen. The new concepts being developed can help to reduce energy costs and pollution.

II . EXPERIMENTAL SETUP AND DETAILS

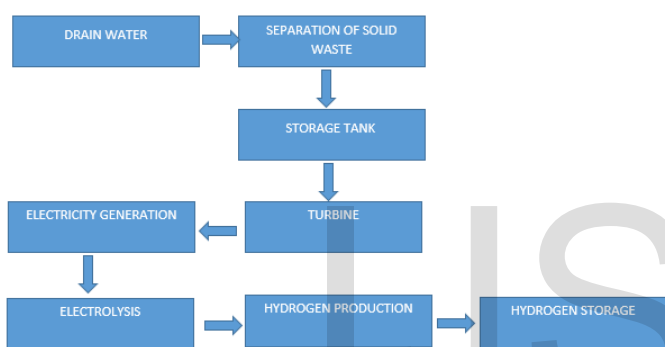


Fig.1. Experimental setup

TABLE NO.1 : II . DIMENSION AND SPECIFICATION

Sr no.	Component	Dimension (mm) / specification
1	Tank	240×180×30
2	Pipe	Φ15
3	Chamber	Φ100
4	Turbine	Φ100
5	Flapper Motor	12V , 3.5A 3.5 RPM
6	DC Generator	12V
7	Pump	6V

SPECIFICATIONS :

1. Head = 152.4mm
2. Discharge = 14 GPM

III . METHODS

ELECTROLYSIS:

Water electrolysis is its decomposition to give electric current to hydrogen and oxygen gases. Hydrogen fuel (hydrogen gas) and breathable oxygen can be produced using this technique; Although the majority of industrial methods currently produce hydrogen fuel from natural gas. A DC power source is connected to two electrodes or two plates placed in the water. Electrolysis involves passing through water an electrical current to separate water molecules. At the cathode, hydrogen collects and at the anode, oxygen.

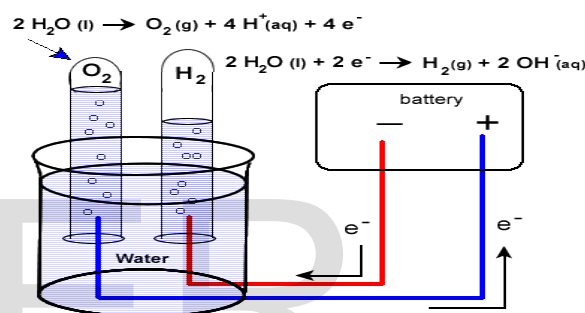


Fig. 2. Electrolysis process

POWER GENERATION:

A water turbine is a rotating machine that converts mechanical work into electrical energy. Flowing water is aimed at a turbine runner's blades and it creates a force on the blades. Because of this force, it creates a rotational effect on the blade and uses the generator to generate electricity.

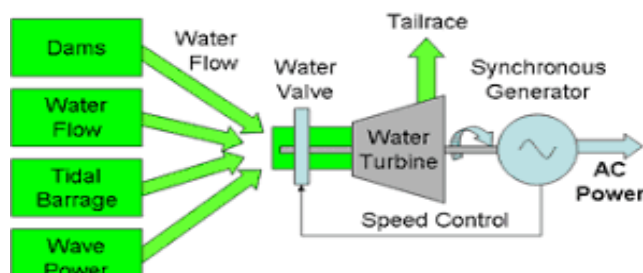


Fig.3. Power generation

IV . RESULTS

With the help of the flapper mechanism solid waste get removed from the drain water and remaining portion of water is used for electricity generation and its produce 12V electricity. Further, this electricity is used for the electrolysis process and 105.3g amount of H₂ get generated from drain water.

V . CONCLUSION

With the help of the flapper mechanism, solid waste can remove. The electricity from the drain water by using a turbine can produce. Production of hydrogen gas can be done by the electrolysis process.

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