

Low cost and indigenous water ionizer machine to provide water with different pH values

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ABSTRACT

In the recent times drinking water has been the most critical issue that almost all the world is facing. Especially in a country like India, it's the chronic issue of utmost importance, which has received less attention. Although people are able to manage the water, quality of the drinking water seems to be a challenge; which ultimately affects the overall health of the body. While everybody across the globes appreciates the importance of the Himalayan water and its qualities as a 'drinking water', the research delves into how water available in households, can be turned into the best possible drinking water with the required qualities. Using alkaline water for drinking is one of the ways to achieve health. Very less research has been done over it. So it was taken as a challenge to work on the technology to achieve required alkalinity of the output water. This technology can provide user not only the alkalinity but also any required pH value in the specified range. Water ionizers that are used to obtain different pH that are available in foreign countries are quite expensive because of the use of platinum sheets as electrodes. This paper focuses on substituting the platinum electrodes to SS316 Plates as electrodes to obtain water of different pH.

Keywords: Low cost water ionizer, SS316L plates

INTRODUCTION

Water purifiers are now a days equipped with water ionizing techniques. Water ionizers are an appliance that gives us purified water with different pH. We could get alkaline water as well as acidic water according to the pH we need. Consumption of alkaline water results in a variety of health benefits, making it similar to the alternative health practice of alkaline diets.

Water ionizer is the upcoming technology that will be extensively used in the healthcare domain. Some people are highly affected by just normally purified water therefore doctors are suggesting to consume. Alkaline water for different applications: To improve the digestion

system, body metabolism, to remove the toxic material from blood naturally. Alkaline water is extensively used to cure skin diseases. Ionizer was originally invented for medical use in Japanese hospitals [1]. Kangen water has incredible life-long health benefits and aids in the prevention and treatment of many diseases.

Currently only few companies from Japan (for ex. Kangen) and Europe, USA are having the technology and manufacturing facilities, and so the monopoly in the global market. The Kangen ionizer uses platinum electrodes for its electrolysis unit therefore making the ionizer expensive.

Therefore to make the ionizer costs effective testing and analysis were done on

SS316L plates to be used as electrodes which prove to be a promising solution.

METHODOLOGY

Problem Identification:

An ionizer costs a lot in the market and it is difficult to make it available in mass for a reasonable price [2]. The ionizer made by the Japanese company Kangen is quite pricey accounting up to 3 lakhs to 4 lakhs. The reason for the ionizer to be so costly is that platinum plates are used as electrodes.

Problem Definition:

To design and develop the product to achieve the similar results as global benchmark products such as Kangen, build the proto-type locally, test it and introduce it into market as MVP (Minimum Viable Product) such that when scaled up in future, it will be available for masses at competitive and affordable cost and help Healthcare Infrastructure, so as to achieve desired results of Make In India mission!"

Identifying potential solutions:

One of the potential solution that is considered is that the cost can be brought down if the materials are substituted. If the platinum plates that are used as electrodes in the stack are substituted by SS316L plates the cost can be reduced [3]. SS316L plates are more likely to have most of the properties that supports the manufacture of the ionizer

Validate and finalize the most suitable solutions/ Pathway

Stainless brands can be considered as accoutrements for bipolar plates due to lower costs and superior plasticity. These parcels grease mass product and the fabrication of a veritably thin plate. Among pristine brands, austenitic pristine sword possesses the stylish erosion resistance and plasticity.

First Cut Design:

The first cut design includes all that's necessary to manufacture the ionizer which includes the pump, flow regulator SMPS ionizer stack H-bridge and current sensor. The ionizer stack is the main and foremost important part of the entire system. The ionizer stack houses the SS316L plates as electrodes and the silicon gasket and filter paper for the filtration process

Design Validation (POC- Proof of concept)

This project focuses mainly on the idea of designing the ionizer stack. The concept that is followed is that instead of the platinum electrodes the ionizer stack is made of stainless sleet plates providing the same result a platinum electrode can [4]. So the stack devised in such a way in which it's cost effective and equally efficient.

Analysis

Proto-typing Manufacturing
Testing and Validating
DFMEA (Design Failure Mode & Effect analysis)

Marketing procedure of the product

Pilot Production and Market Testing
Release the final product
Mass Manufacturing and Sales
Aftersales / Continuous Improvement
Product Obsolesence Management (Cut off the production and sales in phase wise manner)

RESULTS

The ionizer stack is the main part where the SS316L plates are used. It is a set combination of two gasket and one SS316L plate as shown in Figure 1. Where the SS316L plate is placed between the two gaskets. Here the electrolysis occurs which gives us alkaline water and acidic water separately.



Fig.1:-Ionizer Stack

These sets are known as stack. They are designed in such a way that they can provide us with separate streams of acidic and alkaline water [5]. It does not allow the gases to mix within the stack

water that is rich in oxygen. The current is supplied to the stack by the SMPS, where the current can be varied by the SMPS which will impact the acidity and alkalinity of water as shown in Table 1.

Here our main objective is to get alkaline water that is rich in hydrogen and acidic

Table1:-Depicting the observations of different pH using the SS316L ionizer stack

Current (A)	Voltage (V)	Alkanity	Acidity
3.4	29.2	6.7	8.2
3.9	29.2	6.5	8.4
4.3	30.5	6.6	8.6
5.4	29.4	6.2	8.6
6.3	30.5	4.8	8.0

CONCLUSION

The SS316L plates poses to be an excellent substitute to the electrodes used in conventional water ionizer. It could be also noted that if the stack arrangement is increased the mechanism could be more efficient provided that sufficient current is supplied.

possible that SS316L to be used in large systems of electrolysis by varying parameters to increase efficiency.

FUTURE SCOPE

The ionizers could use the SS316L plates an electrodes and be made more efficient. Its properties and characteristics are almost perfect to be used in the mode of electrolysis for ionizers. It could also be

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