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Oxygen Generation from Water Using Electrolysis For Covid 19

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Abstract: *The supervisor, who provides a task and a label for this project, is the source of the idea to develop oxygen generation from water. This project focuses on the design, construction, and system for producing oxygen from water in a machine. This oxygen generator machine's body structure and mechanical system must take into consideration additional factors, such as strength, safety, and ergonomic design, in order to meet the project's goal. Before developing the Oxygen generation from water, this project must go through the design, analysis, and fabrication processes, and it must be compared to comparable products on the market. It is due to the analysis of client needs and the development of new features in a new design. The final year project for a degree will last the entire final semester before moving on to industrial training. This is also a chance for the student to demonstrate or use their skills in using software for mechanical design and manufacturing processes. To ensure that the full strategy is carried out, time management and careful planning are also crucial. Last but not least, you need discipline to finish this project.*

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I. INTRODUCTION

Transporting oxygen cylinders, especially to far-flung hospitals, from several private providers in large cities is expensive and logistically challenging. Depending on the degree of hypoxemia and the amount of oxygen required, a single oxygen cylinder could provide one person for anywhere from 24 to 72 hours. However, a cylinder can run out since severe COVID-19 patients frequently experience hypoxia for longer than a week. Oxygen concentrators are little devices for the bedroom. They draw in atmospheric air and filter out nitrogen, which makes up 78 percent of the atmosphere, to leave almost pure oxygen. In North America and Europe, they were created commercially for the home treatment of adults with chronic lung diseases. They have successfully given oxygen in hospitals in low- and middle-income nations since the 1990s.Supply of drinking water. Asia, Canada, and most recently Papua New Guinea have all used them. They are produced in the US and China. Some are manufactured and ready to transport to medical facilities. To operate them, all that is needed is an electrical connection and a certified biomedical technician. The ability of oxygen generators and concentrators to provide an entire region or health care without the assistance of commercial gas companies is one of their main advantages. So we came up with the concept of using power and water to generate oxygen on demand at the patient's bedside. We are able to directly pump oxygen from water into ventilators, solving India's oxygen shortage.

II. PROBLEM STATEMENT

Transporting oxygen cylinders, especially to far-flung hospitals, from several private providers in large cities is expensive and logistically challenging. Depending on the degree of hypoxemia and the amount of oxygen required, a single oxygen cylinder could provide one person for anywhere from 24 to 72 hours. However, a cylinder can run out since severe COVID-19 patients frequently experience hypoxia for longer than a week. Oxygen concentrators are little devices for the bedroom.

III. EXISTING SYSTEM

An oxygen generator is a device that uses pressure swing adsorption, a unique selective adsorptive technique, to separate oxygen from compressed air (PSA). With 21% oxygen and 78% nitrogen, compressed air utilised in the

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oxygen generation process has a comparable chemical make-up to outside air. Compressed air's oxygen is permitted to pass through a molecular sieve made of zeolite, which traps nitrogen and produces high purity oxygen at gas production outlets. With one significant exception, the pressure swing adsorption procedure for a PSA oxygen generator is virtually identical to that for a nitrogen generator. Instead of the carbon present in a nitrogen PSA device, the adsorptive material inside its molecular sieve is constructed of zeolite.

IV. PROPOSED SYSTEM

Two electrodes or two plates-typically made of an inert metal like platinum or iridium-that are saturated with water are connected to a DC electrical power source. At the cathode (where electrons enter the water), hydrogen will appear, and at the anode, oxygen. In the case of ideal faradaic efficiency, twice as much hydrogen as oxygen is produced, and both are equal to the overall electrical charge carried by the solution. However, several cells have competing side reactions, which produce different products and display poor electrocatalytic efficiency.

V. PRINCIPAL

Typically, breaking water molecules by electrolysis is the process. Alkaline solution (electrolyte) is present during this process, and electricity is needed as an input. Hydrogen and oxygen are separated from water molecules in the electrolyser cell. Due to the endothermic nature of the reaction, electricity is needed as an energy source. Anode and cathode, which are both submerged in the electrolyte solution, make up a basic water electrolysis unit. An external DC power source is used to connect the electrodes. Electrons move from the negative terminal of the DC power source to the cathode when the unit is powered by DC. The hydrogen protons and electrons unite at the cathode to form H2. Then, H2 ions flow in the direction of the cathode and hydroxide ions in the direction of the anode. Figure 1 illustrates the development of H2 and oxygen gases at the cathode and anode, respectively. Overall, 2 H2O (l) 2 H2(g) + O2 is the reaction Thus, there are twice as many hydrogen molecules created as there are oxygen molecules. The hydrogen gas created has consequently twice the volume of the oxygen gas produced, assuming the same temperature and pressure for both gases.

VI. BLOCK DIAGRAM

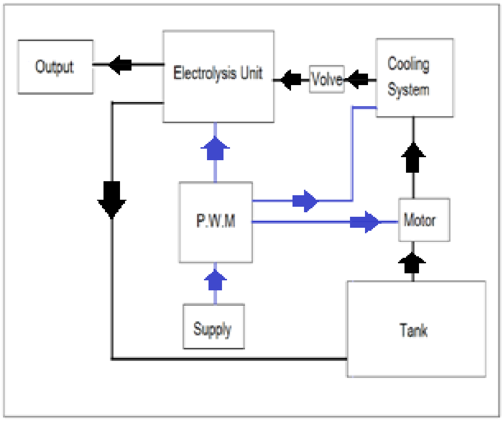

Fig.No.1-Block Diagram

The block diagram shows arrangement of the entire component used in the project. From the first we need electrical supply but for the project operation we need DC supply so we connect the AC to DC converter charger to the AC supply unit. Then the charger gives supply to the PWM unit, the PWM means Pulse Width Modulation unit it controls the output supply to the Electrolysis unit.

The PWM unit gives output supply to the Electrolysis unit, Motor and cooling system. The most important thing to produce oxygen is water. For this water storage we need a tank the tank is made up of plastic. To transfer water from tank to Electrolysis unit we need a motor. The motor is operated on DC supply. After this we need cooling system for minimize the temperature of water. The water is heated in electrolysis unit so we need to minimize the temperature of the water so we need a cooling system. In the cooling system there is two components is used that is Radiator and Fan. For the operation of fan we need supply that we gives from the PWM unit.

Then the water is transfer from the cooling system to Electrolysis unit. In the Electrolysis unit there is main function done that is production of oxygen. For the operation and working of electrolysis unit we need supply that we take from the PWM unit. The valve is connected between the Cooling system and electrolysis unit. The function of Valve is to give continuous water supply in the Electrolysis unit. Their for the water is not over flow in the electrolysis unit. Then from the electrolysis the output is given to the output unit. After the electrolysis the water is transfer to the water tank and it again reused.

For the connection of electrical supply we need the wires. That is connected in in between the Supply unit, Motor, Cooling System and Electrolysis unit. The connection of the supply is connected through the Blue line in Block Diagram. For the transfer of water supply we use plastic pipes that is connected between the Tank, Motor, Cooling System and Electrolysis unit. The connection of water supply is connected through Black line in Block diagram. All the equipment's are situated in metal stand.

VII. FLOWCHART

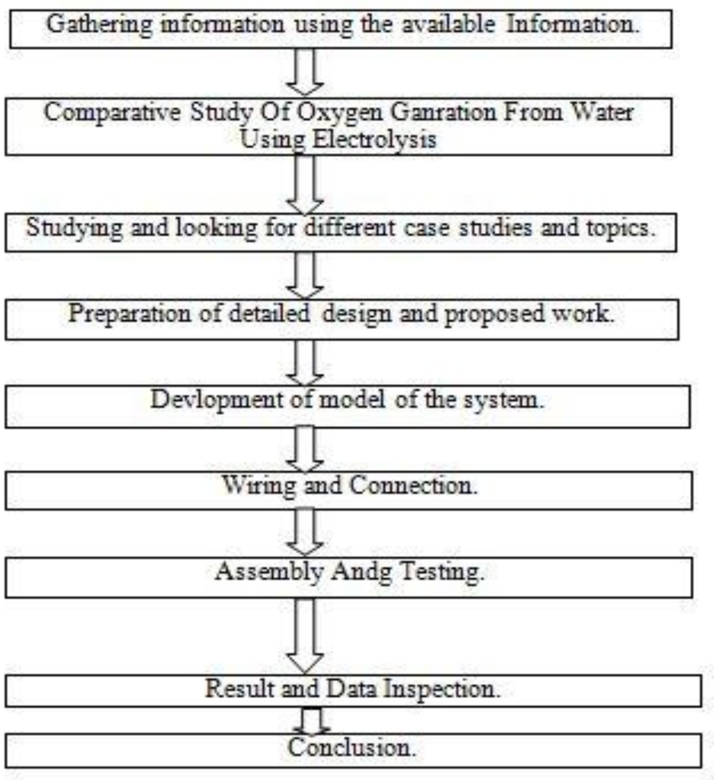

Fig.No.-2. Flowchart

VIII. EQUATIONS

Cathode (reduction):	2 $H_2O(l)$ + 2e−	→	$H_2(g)$ + 2 OH−(aq)
Anode (oxidation):	2 OH−(aq)	→	1/2 $O_2(g)$ + $H_2O(l)$ + 2 e−

Thus, there are twice as many hydrogen molecules created as there are oxygen molecules. Given that both gases are created at the same temperature and pressure, the hydrogen gas has twice the volume of the oxygen gas. The amount of electrons driven through the water is equivalent to four times as many oxygen molecules as there are hydrogen molecules

IX. RESULT

Electrolysis, a procedure that includes passing a current through a water sample containing a soluble electrolyte, can do this. As a result, oxygen and hydrogen are separated out of the water and released at the two electrodes. The positively charged electrode (anode) will collect oxygen, and the negatively charged electrode will collect hydrogen (cathode). The H_2O molecule contains positively charged hydrogen, which is why it ends up at the negative electrode.

X. FUTURE SCOPE

Water electrolysis is a well-known technology that has been applied in a variety of industrial applications for almost a century (food industry, power plants, metallurgy, etc.). It is now regarded as a crucial procedure that can be utilised to produce high-purity hydrogen from water and renewable energy sources. Water electrolyzers are anticipated to play a larger role in the decentralised production of hydrogen in the near future, such as in hydrogen refuelling stations.

XI CONCLUSION

The electrolysis of water results in the production of hydrogen gas at the cathode and oxygen gas at the anode. The machine was put through testing to assess performance, and the results revealed that the study was successful because it had an efficiency of 75.7%. The gadget will therefore unquestionably make it easier to produce oxygen in large quantities from water.

- By adjusting efficiency, this machine might one day be able to create oxygen with the highest possible purity while also producing more of it.
- Every person would benefit from this device's ability to readily create oxygen from water.

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