

Solar Powered Water Purifier

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Abstract: The sun has been the major source of energy for life on earth. Solar energy is almost unbalanced, so we make a solar powered water purifier. Solar plate is used to provide the source to the battery charging. It is an unconventional system for the purpose of producing water purifier on the remote area. The battery charge control is done by the charge controller. Water purifier operations are done by using dc motors. The whole supply is provided through the battery while electric motor rotates which operate a water purifier.

Keywords: solar power, water heater

1. Introduction

In India the people in villages drink from ponds where clothes are washed, people throw junk into them and animals are washed. In towns too the water is usually not very clean. One of the most important functions of municipalities is to filter water and add disinfectant like chlorine. In some areas there is excess fluorine. Even in Europe and much favored USA, there are many regions where water does not contain sufficient minerals. Hence they drink artificially mineralized water or natural mineral water available from a particular location.

Clean drinking water is a basic right of all people. The government must supply healthy drinking water. In schools too, clean drinking water is essential. Prime Minister Modi started a mission called Namami Gange, to clean the river Ganga. In the last ten years, the filter water suppliers have established numerous plants to filter, chemically treat, and add minerals to water, and supply in 20 litre cans. Water filters have been available in India commercially since last 40 years. But nowadays latest scientific purification methods are excellent and supply healthy drinking water at a reasonable cost.

2. Working principle

The water purification is based on RO system. The full form of RO is 'Reverse Osmosis'. Reverse Osmosis uses RO membranes to purify water. An RO membrane is like a very, very fine cloth, so fine that it can filter out from water chemical molecules. A molecule is at least a thousand times smaller than the smallest of viruses, bacteria, or any germ. So an RO water purifier not only removes all bacteria and virus from water but will also get rid of all poison chemicals like Heavy Metals, Pesticides, etc. An RO water purifier is the best type of water purifier for home use.

The image below is used to explain what RO (reverse osmosis) is and how RO water purifier works. The holes or

pores of an RO membrane, through which water is filtered out, is so small, that it traps not only the smallest of bacteria or virus but also blocks chemical molecules like that of salt.

How Do Reverse Osmosis Filter Systems Work & What Do They Do?

If you're looking for a water filter that will provide outstanding drinking water for your home or business, Reverse Osmosis (RO) filtration is one of the most popular and best water filtration methods available. In simple terms, reverse osmosis works as water is forced across a semi-permeable membrane, leaving contaminants behind that are flushed down the drain. The clean drinking water collects in a holding tank.

3. There are generally four stages in the reverse osmosis process

1. *Sediment Filter:* This pre-filter stage is designed to strain out sediment, silt, and dirt and is especially important as the sediment filter protects dirt from getting to the delicate RO membranes that can be damaged by sediment.
2. *Carbon Filter:* The carbon filter is designed to remove chlorine and other contaminants that affect the performance and life of the RO membrane as well as improve the taste and odor of your water.
3. *Reverse Osmosis Membrane:* The semi permeable RO membrane in your RO system is designed to allow water through, but filter out almost all additional contaminants.
4. *Polishing Filter:* In a four-stage RO System, a final post filter (carbon filter) will "polish" off the water to remove any remaining taste and odor in the water. This final filter ensures you'll have outstanding drinking water.

4. Mechanical parts name

Block diagram consist of following components:

1. Solar Panel
2. Charge Controller
3. Battery
4. Inverter
5. Dirty tank
6. Water purifier
7. Pure water
8. Motor

A. Mechanical Parts Description

1) Solar panel

Solar panels absorb the sunlight as a source of energy to generate electricity or heat. A solar panel works by allowing photons, or particles of light, to knock electrons free from atoms, generating a flow of electricity. Solar panels actually comprise many, smaller units called photovoltaic cells. (Photovoltaic simply means they convert sunlight into electricity.) Many cells linked together make up a solar panel. Each photovoltaic cell is basically a sandwich made up of two slices of semi-conducting material, usually silicon — the same stuff used in microelectronics. The price of solar power has continued to fall so that in many countries it is cheaper than ordinary fossil fuel electricity from the grid (there is “grid parity”).



Fig. 1. Solar panel

2) Battery

Solar cell module produces electricity only when the sun is shining. They do not store energy it is necessary to store some of the energy generated by the solar panel. It is also used for the powering operation system. The battery is of 12V DC. The terminal voltages of a battery cell depend on the chemicals and materials used in its construction, and not on its physical sizes. For example, primary alkaline batteries have a nominal voltage of 1.5 volts Rechargeable Ni Cd and Ni Mh typically output 1.25 volts per cell. Devices intended for use with primary batteries may not operate properly with these cells, given the reduction in voltage.



Fig. 2. Battery

3) Charge controller

A charge controller, charge regulator or battery regulator limits the rate at which electric current is added to or drawn from electric batteries. It prevents overcharging and may protect against overvoltage, which can reduce battery performance or lifespan, and may pose safety risk.



Fig. 3. Charge controller

4) Inverter

An inverter is an electronic device capable of transforming a DC current into an alternating current AC at a given voltage and frequency. For example, If we have to supply a household appliance that operates in alternating current 230volt (50Hz frequency) but we do not have the AC power available , we can still power it by using an inverter such as a 12V (DC).It is therefore indispensable to use it to power by DC, electrical devices that work in AC. The inverters are also used in many other applications, ranging from UPS to the speed controllers of electric motors, from switching power supply to lighting. The term “inverter” also refers to a “rectifier – inverter” group. Powered by alternating current and used to vary the voltage and frequency of the output alternating current in function of the input voltage.



Fig. 4. Inverter

5) Water purifier

The water purification is based on RO system. The full form of RO is 'Reverse Osmosis'. Reverse Osmosis uses RO membranes to purify water. An RO membrane is like a very, very fine cloth, so fine that it can filter out from water chemical molecules. A molecule is at least a thousand times smaller than the smallest of viruses, bacteria, or any germ. So an RO water purifier not only removes all bacteria and virus from water but will also get rid of all poison chemicals like Heavy Metals, Pesticides, etc. An RO water purifier is the best type of water purifier for home use.



Fig. 5. Water purifier

6) *Motor pump*

Pumps basically use the forces of nature in order to move the liquid. With the beginning of movement in the pump parts such as an impeller or piston diaphragm, air is pushed out of the way. The working principle of a water pump depends on the type of motor – Electric, Centrifugal, Diesel Driven, etc. The main principal behind the working of every water pressure booster pump for home is the conversion of energy into mechanical energy and using it for providing the required pressure for pumping the water.



Fig. 6. Water pump

7) *Water tank*

The main function of water tank is store the water it is also called the storage tank. Water tank storing water on the building's roof, gravity does the work in distributing water to the lower floors. The tank is filled with water from the mains system by basement pumps, and as the tank empties, it triggers the pumps to refill it. In this way, the tower acts as both a water source and reservoir.



Fig. 7. Water tank

5. **Conclusion**

By doing this project we conclude that save electricity. It can be used in Industries, where the save of the electric energy so the increase the overall productivity of the organisation. The possibility of using clean energy in water purification, which is environment Friendly and worth-while to promote. It can be adopted as Backup in future electricity in industries. It is a good method of earning, start the small business firm of Rural and Urban areas.



Fig. 8. Solar powered water purifier

Acknowledgement

Mr. Gaurav Verma, our guide encouraged us to carry this work, his continuous invaluable knowledge guidance throughout the course if this study helped us to complete the work up to this stage and hope will continue in further research.

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