SIWI
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Nigerian Stockholm Junior Water Prize national winner's project

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TITLE OF PROJECT: **Solar Cyanotoxins and Aromatic Contaminants**
(SoCAC) WATER PURIFIER

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ABSTRACT

Water pollution constitutes a major set-back to the availability of safe water for consumption and other uses, especially in less-developed countries. In consonance with this year's theme, "Seeing the unseen: The value of water", I have the intention of solving this great menace. In this paper, we will have an insight into certain problems we all encounter in everyday life and how they affect us. SoCAC (Solar Cyanotoxins and Aromatic Contaminants) Water Purifier stands as the solution to these problems. This paper will also highlight the importance and applications of SoCAC Water Purifier over other methods of water purification.

INTRODUCTION

Planet Earth, being the frontline planet where life exists, is bountifully blessed by nature. Resources like water, which is as old as man, are useful in our everyday life. It is available in many forms, such as tap water, river water, spring water, sea water and rain water. Chemically, water is made up of hydrogen and oxygen and it exists in a solid, liquid and gaseous state (steam). About 71 percent of the earth's surface is covered by water. As a result, it is one of the most abundant liquids on earth. Water is needed in most vital aspects of human endeavor. These include: transportation, consumption, production, agriculture and generally for healthy living, which is responsible for producing an ideal human being.

Despite all the advantages of water to the planet, human actions tend to impact negatively on earth's water bodies. These adverse activities lead to water pollution. Water pollution is, therefore, the contamination of water with harmful substances and pathogenic organisms that can threaten human health or the natural environment. Oil, fertilizer residues, pesticides, industrial

water and effluents, domestic and city wastes are pollutants if discharged into water without treatment.

Globally, about two million tons of pollutants move into the world's water daily. According to World Health Organization (WHO), 3.2 million children under the age of five in developing nations die each year as a result of unsafe drinking water and poor sanitation. Consequently, there are emergence of various diseases that hunt life on earth. Aquatic animals such as sea turtles and whales are on the verge of extinction due to water pollution.

Moreover, inhabitants of some countries of the world, especially Africa ignore the principles and rules of hygiene and cleanliness of water. Some drink water with particles after allowing the particles to settle at the bottom, while others believe there is no adverse effect of doing such. Though technologies like municipal water supply are being used to address this issue, it is a herculean task for an ordinary person especially in developing nations to obtain clean water.

SoCAC Water Purifier which is capable of making our environment a better place for habitation is a key solution to water hygiene and a sustainable future.

DESCRIPTION OF PROJECT (SoCAC Water Purifier)

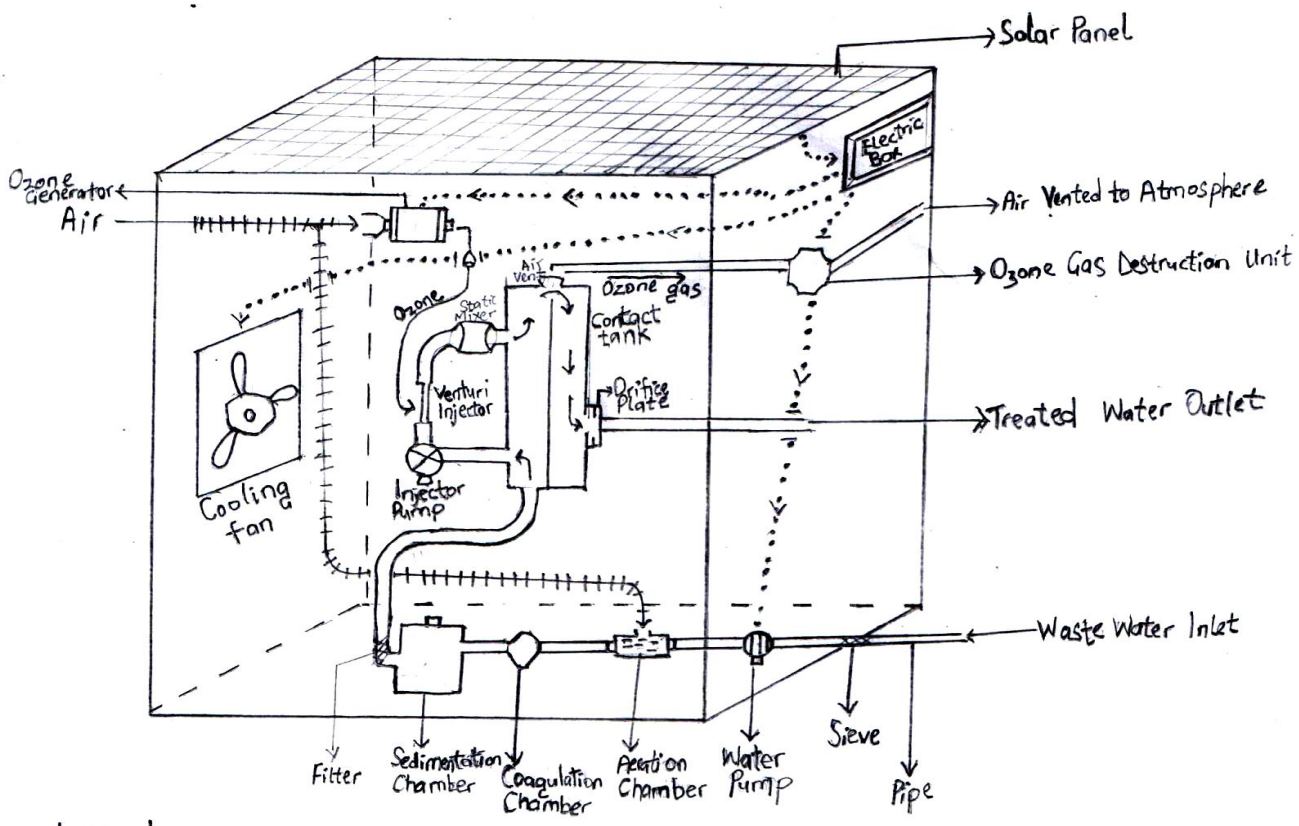
SoCAC Water Purifier is a device I am building with the intention of tackling the issues of water insecurity, water sanitation and eliminating the spread of water-borne diseases. 'SoCAC' is an acronym for Solar Cyanotoxins and Aromatic Contaminants. SoCAC Water Purifier is a device

that uses the principle of separation techniques in addition to ozonation (which removes cyanotoxins and some aromatic contaminants) to convert waste water to safe water. The source of electricity used by this device is solar panel because it is environmentally friendly and it promotes a greener atmosphere for healthy living. The energy produced by the solar panel powers the cooling fan, ozone generator, and generally, the device.

METHODS AND PROCEDURE

Waste water is injected into the device through the pipe. Before the waste water gets into the internal chamber, it is filtered to remove debris (sand, plastic, stone etc.). The filtered water gets to the aeration chamber where air is added to it in order to remove carbon dioxide and also to oxidize soluble iron and manganese to insoluble precipitate. After aeration, it is then coagulated. In the sedimentation chamber, the effectiveness of ongoing filtration is increased to minimize particle concentration in the water. The water is then transported to the contact tank for disinfection of water and release of any excess gas that did not go into the solution. The venturi injector adds ozone produced by ozone generator into the water and later dissolves the ozone. Water runs out from the upper to the lower part of the contact tank with high velocity produced by the differential pressure across the orifice. Finally, fresh and safe water is produced by the SoCAC Water Purifier.

DIAGRAM OF THE SoCAC WATER PURIFIER



Legend

- Current flow
- Air flow

Diagram of the SoCAC Water Purifier

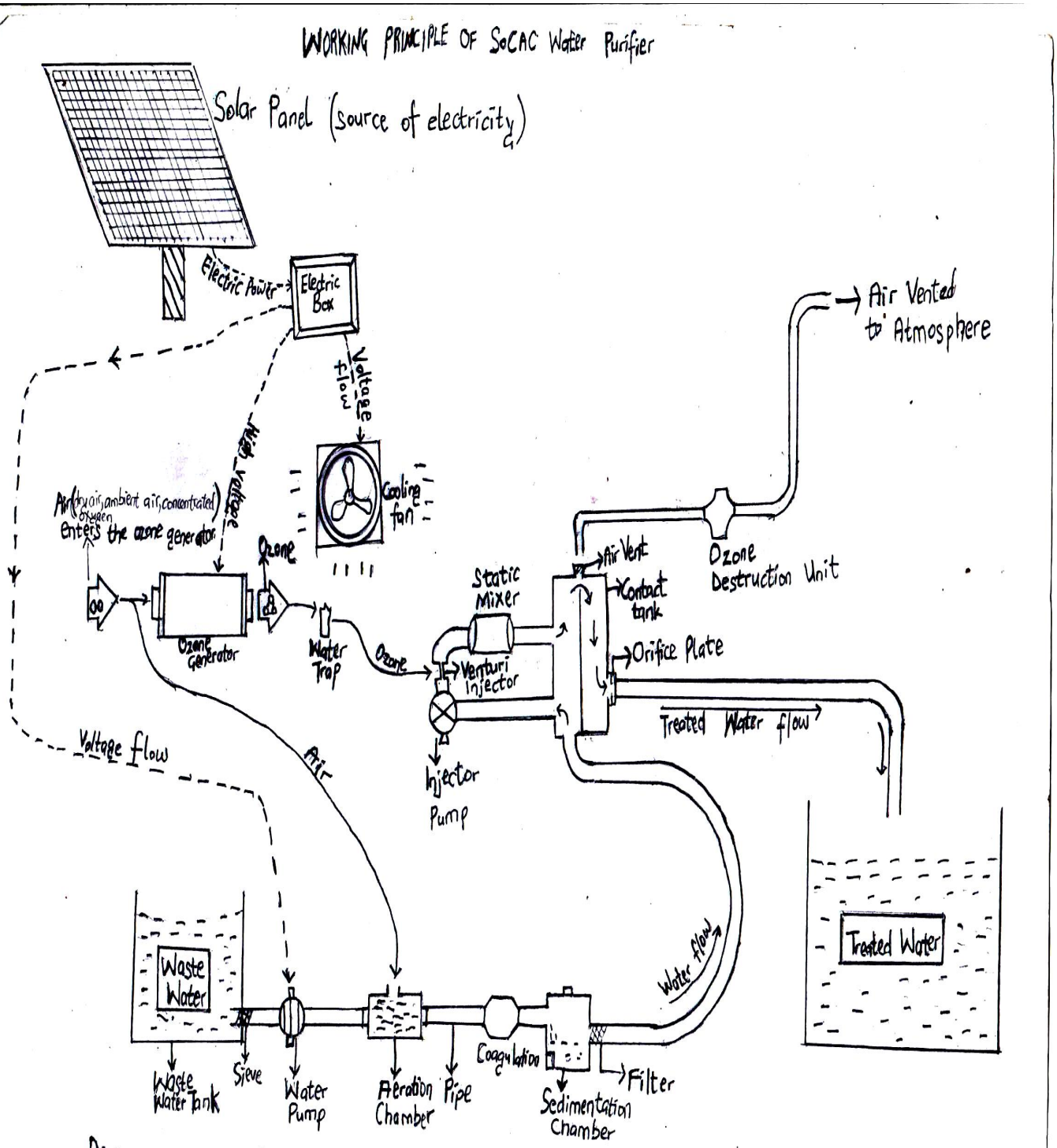
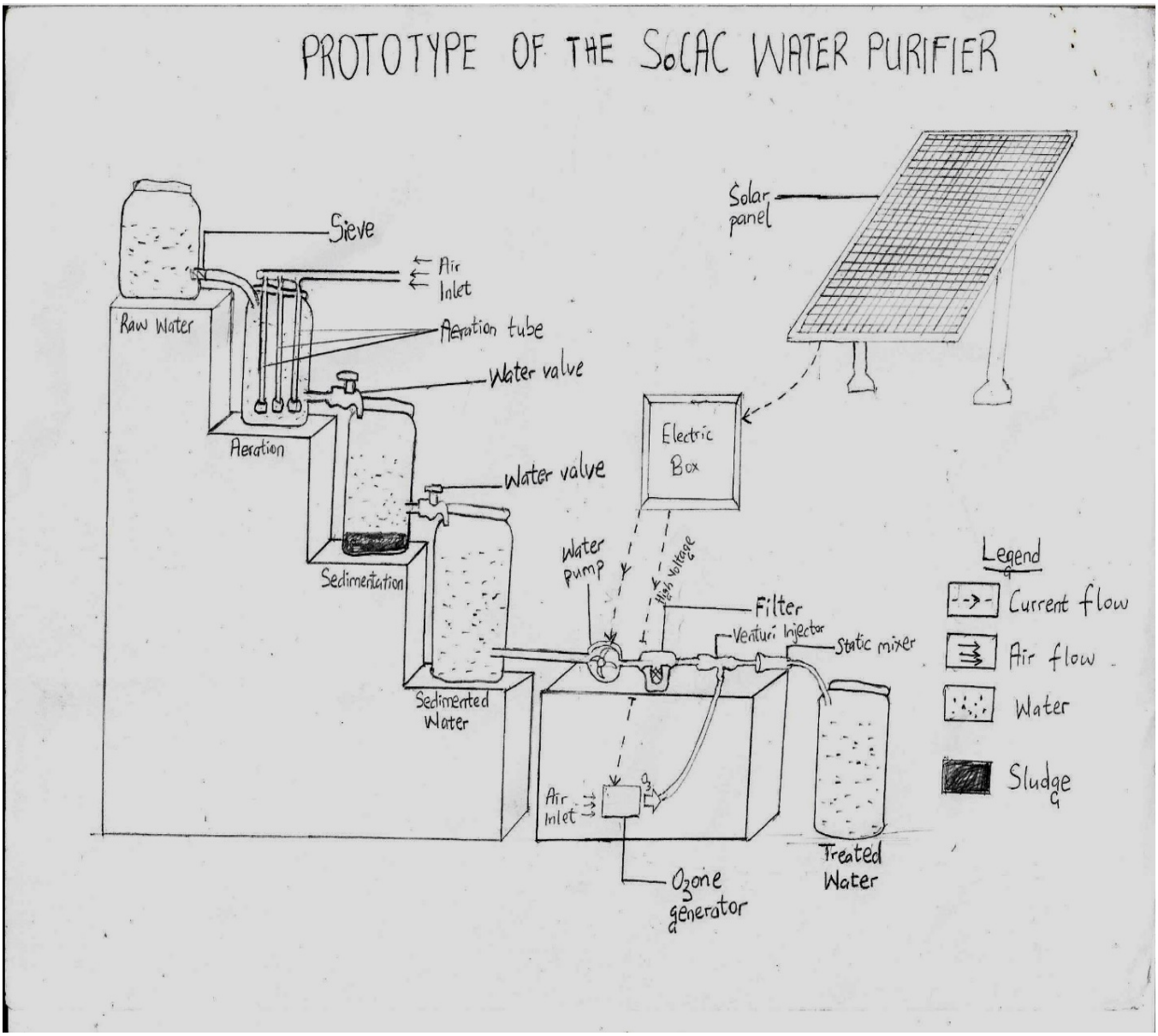
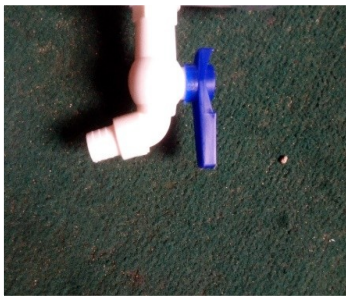


Diagram Showing the working Principle of the SoCAC Water Purifier

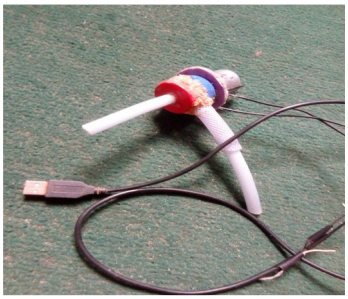

PROTOTYPE OF THE SoCAC WATER PURIFIER
Solar panel
Sieve
Air Inlet
Raw Water
Aeration tube
Water valve
Aeration
Electric Box
Water valve
Sedimentation
Water pump
High voltage
Filter
Venturi Injector
Static mixer
Sedimented Water
Legend
Current flow
Air flow
Water
Sludge
Air Inlet
O3
Ozone generator
Treated Water


WATER
AERATION
SEDIMENTATION
S.C.A.C
WATER
PURIFIER

Materials used in making the Prototype



Water valve/tap

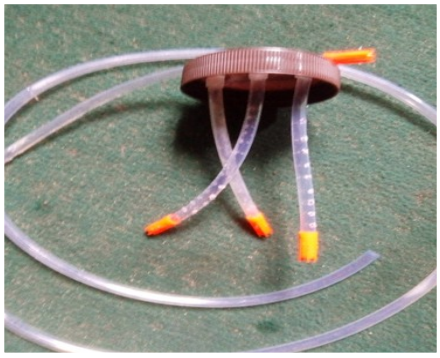


Water pump

Plywood or
carton platform

Plastic container

Hose



Aeration
tube

Filter

Ozone generator

Other materials are:

- Venturi injector
- Static mixer

APPLICATIONS OF SoCAC Water Purifier

SoCAC Water Purifier can be used in various environments, institutions, workplaces and fields. These applications are as follows:

1. It can be used to provide clean water for home activities.
2. SoCAC Water Purifier can be used in laundry for providing safe water used for washing clothes.
3. The services of SoCAC Water Purifier can be employed in laboratories for experimental and research purposes.
4. SoCAC Water Purifier can be used in educational institutions as teaching material/aid.
5. It can be used in the farm for providing clean water for livestock and crop production.

6. Most of all, it can be used everywhere to keep the world safe.

CONCLUSION

SoCAC Water Purifier is an accessible and more reliable innovation which provides safe water for the society. It supports the UN Sustainable Development Goals. This device reduces the stress and effort of purifying water. It reduces water pollution, thereby, enhancing environmental cleanliness. Generally, SoCAC Water Purifier is a sole aid in preserving the earth.

Our need calls for hybrid of knowledge, skills and solutions. SoCAC Water Purifier is an effective device that will change the world for good. According to Barack Obama, “A change is brought about because ordinary people do extraordinary things.”

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