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DESIGN AND FABRICATION OF UP DE-SALINATOR KIT

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ABSTRACT

Water, is an endless requirement of the living thing all around the universe. But now it is reaching a level of scarcity in all regions which had rich water sources before. This not achieved naturally but we humans in order to find solutions on living with luxury lead a test with environment by destroying the forest, over utilization of ground water sources, improving the level of chemicals in the available ground water with use of chemical fertilizers and with several forms of destructive techniques. Thus we humans who started this should find a solution to end up the arising situation. Which not only have brought solution to the available problems but also acts as a solution for the problems which are going to arise further.

Keywords: UnPowered De Salinator Kit; Thermal Distillation; Reverse osmosis; Rainmann effect.

1 INTRODUCTION

Imagine a future where there will be no sort of sources avail to get water even not for drinking, which describes the Quote "There will be huge amount of water around us but we are not suppose to drink since it is saline in nature" The above mentioned line express the meaning that the reduction of ground water level and increased global warming makes the ice mountain around the world gets melt which pushes as to live in seas (Abraham, et al., 2011). Thus there no chances of getting anything, everything will be immersed under the ocean, the only way to get water to drink is desalination of the water which avail around us , even there are several techniques like Thermal distillation; Reverse Osmosis; Rainmann effect, etc

But the above mentioned techniques like Thermal Distillation and Reverse Osmosis required external power like motor, pump, heat exchangers, solar panel,etc (Senthilrajan et al., 2014). Thus, an efficient technique to achieve a maximum efficiency is derived and executed as our 6th semester mini project and the document explains all about it.

2 MATERIALS AND METHODS

2.1 Conventional Method: Thermal Distillation is based on the principle of Rainmann effect where it's working procedure is followed as , the sea water which is taken as an intake filtered at least twice in normal and passed through the heat exchanger where it gets converted into steam and the salt particles gets deposited at the base which is removed through the setup arranged. Then the produced steam is cooled by a condenser setup, finally resulting in the formation of pure water (Ganeshan et al., 2016). Whereas in the Reverse Osmosis process the sea water is made to pass through several stages of filters and chemical membranes which removes ions present in it , as a result of continues filtration pure water which is edible to drink is obtained.

Condensation is the change of the physical state of matter from gas phase into liquid phase and is the reverse of evaporation (Dharmalingam et al.,2014). The word most often refers to the water cycle.[1] It can also be defined as the change in the state of water vapour to liquid water when in contact with a liquid or solid surface or cloud condensation nuclei within the atmosphere. When the transition happens from the gaseous phase into the solid phase directly, the change is called depo-called deposition (or de-sublimation, see sublimetion (phase transition).

Evaporation is a type of vaporization of a liquid that occurs from the surface of a liquid into a gaseous phase that is not saturated with the evaporating substance. The other type of vaporization is boiling, which is characterized by bubbles of saturated vapor forming in the liquid phase (Chandrasekaran, et al., 2013). Steam produced in a boiler is another example of evaporation occurring in a saturated vapor phase. Evaporation that occurs directly from the solid phase below the melting point, as commonly observed with ice at or below freezing or moth crystals (naphthalene), is called sublimation.

Moisture refers to the presence of a liquid, especially water, often in trace amounts. Small amounts of water may be found, for example, humidity in the air, in foods, and in various commercial products. Moisture also refers to the amount of water vapour present in the air.

2.2 Proposed Method

Rain, which can be considered as the natural desalination process where the sea water

which is exposed to direct sunlight results in the formation of water vapour leaving the salt deposits gets remain there in the sea. The vapour reaching the atmosphere gets formed as clouds then moves further in the direction of the wind when it gets interfered with cool atmospheric conditions results in the formation of water which is defined by as rain. Through this concept a principle is derived called rainman effect which is defined that the evaporation and condensation of the vapour produced from saline water artificially. Based on the Rainmann Effect the kit for desalination is designed and fabricated here as our project (Friedlingstein et al., 2014). Figure 1 shows the complete metal cut drawing and figure 2 indicates the fabricated model

Figure 1. Metal Cut Drawing

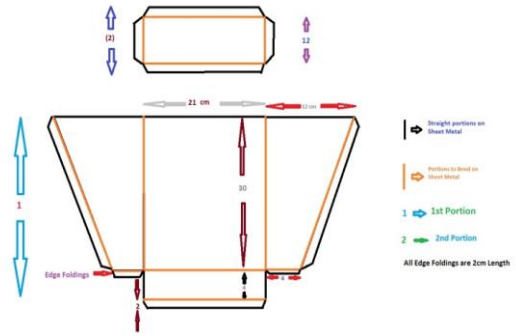

Figure 1: Metal Cut Drawing

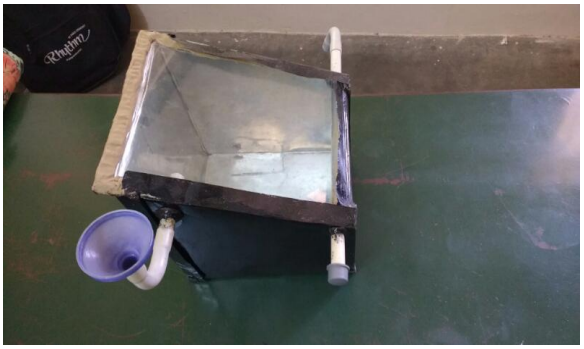

Figure 2: Fabricated Model

3 RESULT AND DISCUSSION

3.1 Water supply unit: Water which is not suitable for drinking and saline water can supplied through inlet and it gets evaporated by the action of solar power and collected as group of moisture according to the setup (Franceyet al., 2013).

3.2 Upper Inclined Glass: The glass in the top acts as a roof which enclose the evaporated vapour and acts as moisture conveyor.

33 Pipes and Valve: There will an inlet pipe with the funnel, an outlet pipe at the end of the top inclined edge and drain pipe for removing sediments out of the setup.

3.4 Blocks and Funnel: These are fittings to make in and out of the processed product each pipes other than inlet have blocks to reduce vapour passing out of setup.

3.5 Sheet Metal Cases: The whole set of the kit has it body made by the cutting and folding of the sheet metal. When the setup is kept in direct sun light by the tray in the setup get filled with saline water, after sometimes due to the action of sunlight and the glass top the salt water gets evaporated resulting in the formation of vapour in the inner surface of the glass top (Elimelech et al., 2011). Thus, this is a closed system the vapour which are

sticked to the glass surface in form of water droplets moved down due to gravity and sliding force, which are then collected continuously with a tub at the bottom. Resulting in the formation of fresh drinking water (Noreddine et al.,2015). Figure 3 shows the microscopic view of sheet metal

- In case of sailing in boat, while there is no water to drink this kit will be helpful to provide enough water to drink.
- When there is less ground water and it needs time to increase, saline water can be supplied to every area through pipelines and it can be desalinated using it.
- It can made huge to achieve output in high scale.
- It can also used during space researches by producing water from vacuum.

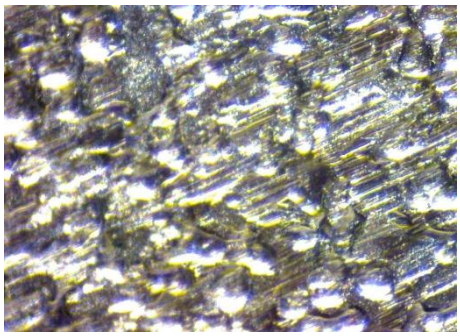

Figure 3. Microscopic View of Sheet Metal

4 CONCLUSIONS

As a result of our experiment, salt water can be purified using solar desalination. Our data supports our hypothesis and results of my experiment help to solve our problem. Although only a teaspoon happened to be our result after 5 hours, we tasted the water, outside of the measuring cup and inside, they both tasted different (Shannon et al., 2008) . This means that our hypothesis was correct. In our experiment, the water evaporated, and formed water droplets on the glass surface and then it eventually dripped into the measuring cup. I did test my control and independent variables and they both tasted different, one tasting very salty, and the other having no funny taste at all.

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