

FINDING AN ALTERNATIVE WAY TO REDUCE THE DEMAND OF POTABLE WATER

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Abstract- The paper presents the results of experiment carried out on the finding of alternate method to generate water from the surrounding to reduce the demand of potable water mostly in dry areas. For this purpose we use the material called silica gel, Silica gel (SiO₂) is a granular, porous form of silicon dioxide made synthetically from sodium silicate. We designed an air tight closed container for silica gel to be placed inside the solar steel basin. Our aim is to design and prototype of an atmospheric water collector. The purpose of this technique is to taking out fresh water from humid air and emphasize on the natural resources. Fresh drinking water is not easily available in modern days^[1]. There are certain locations globally where not even a small drop of water is available. In most of the villages of Rajasthan (India) and many other places, people have to travel through a long distance to reach a water resource. There is abundance of the water in the atmospheric air^[2]. The available water molecules can be a resource which will be used for harnessing the usable water to meet present day water requirements.

I. INTRODUCTION

An atmospheric water collector (AWC) is a device which uses silica gel that extracts water from humid ambient air. Water vapour in the air is condensed by cooling the air below its dew point. AWCs are useful where pure drinking water is difficult or impossible to obtain, because there is almost always a small amount of water in the air that can be extracted. The extraction of atmospheric water may not be completely free of cost, because significant input of energy is required to drive some

AWG processes. In fact, certain medium such as charcoal, cotton, wood or a chemical which have suitable moisture absorbing properties may be used for this. In this experiment, we used silica gel^[3]; a chemically inert material is used to adsorb the moisture from air. Silica gel is hard and tough also it is more solid than common household gels like agar. It is a naturally occurring mineral which is purified and processed into either granular or beaded form as per requirements. As a desiccant, it has an average pore size of 2.4 nanometres. Silica gel is having high specific surface area of about 700-800 m²/g which allows it to adsorb water molecules from the surrounding atmosphere, so it can be used as a desiccant. Nevertheless, material silica gel eliminates moisture by *adsorption* onto the surface of its numerous pores instead of *absorption* into the bulk of the gel.

II. SOLAR STEEL BASIN AND ITS WORKING

Solar steel is an instrument which is used to collect the water through condensation using solar energy. It is of two types: - Passive solar steel and Active solar steel. These solar steels are further classified individually on the basis of their slope as single slope solar steel and double slope solar steel. Various components of solar steel are basin made up of GI sheets having specification 24 gauge, transparent cover of glass, black liner to increase the temperature inside the basin, sealant to make the steel air-tight container, insulation, condensate channel to collect the water generated.

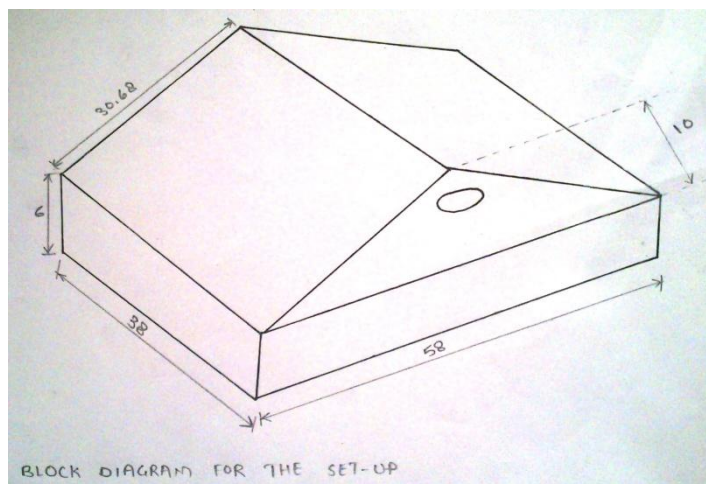


Fig.1 Double slope solar steel

This is simple arrangement in which silica gel is exposed to surrounding air to adsorb moisture and then heated inside an air-tight closed basin and water is collected through suitable arrangement of condensate channel. It consists of an insulated

black painted basin where silica gel is placed. A sloping cover of glass, supported by an appropriate frame, covers the basin made of GI sheet and is sealed tightly to minimize vapours leakage or in other words to make air tight.

III. SPECIFICATION OF SOLAR STEEL

Table 1.1

Sr. no.	Parameters	Double slope
1	Area of basin	0.2204 m ²
2	Height of basin	0.06 m, at sides 0.16 m, at centre
3	Area of glass	0.1165 m ²
4	Thickness of glass cover	0.003 m
5	Angle of Glass(approx.)	20°
6	Silica gel used	1.2 kg

IV. OBSERVATIONS

Table 1.2

Days	Atmosphere temp.	Surface temp. of basin	Inside temp. of basin	Productivity (in 3 hours)
Day 1	37	55	93	60 ml
Day 2	38	58	97	65 ml
Day 3	37.5	57	96	65 ml
Day 4	38	58.5	95	64 ml
Day 5	38.5	59.5	98	70 ml

GRAPHS

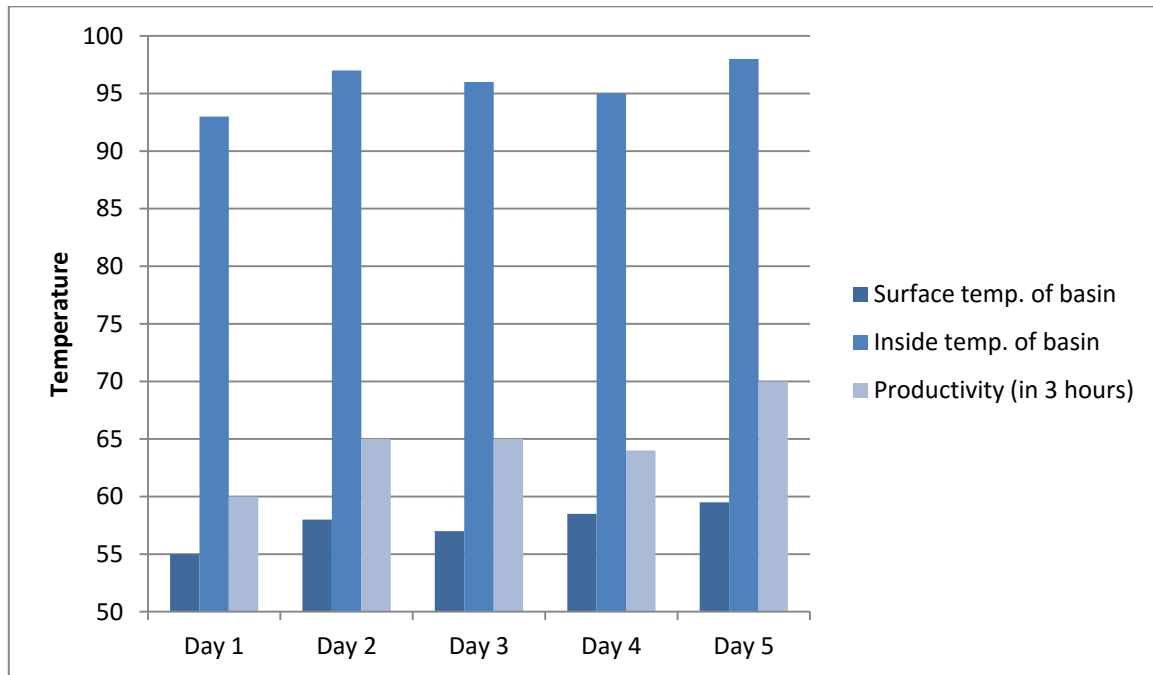


Fig. 2 Productivity of water

V. CONCLUSION

There is great scarcity of water worldwide, especially in arid areas. So there is need to develop Atmospheric Water collector. We used desiccant method for water generation from atmosphere. Silica gel was used as solid desiccant. Double slope casing is used to extract water through condensate channel. Casing is used with 1.2 kg of silica gel. It was observed that 65 gms. of water got extracted. The P_H value of water is 7. We come to conclusion that more water can be extracted in more humid climate like coastal areas of Gujarat. The double shelves can be used to increase the silica gel content. If such a mechanism can be developed which would allow the automatic lifting of silica gel after a suitable duration from bottom of basin to closed space then the process of generation atmospheric water can be made continuous. The experiment can be conducted for various other materials having more efficient moisture absorbing capacity than silica gel and is less costly. To increase the output more silica gel and a larger set-up can be made and advance technologies can be adopted.

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