



Saudi Arabia  
Ministry of Education  
Department of Education in Mecca  
Twenty-fourth high school girls



## Take advantage of air-cooling water to cool air and conserve water



**Presentation of the two students:**

**Manar Meashal al-Harbi - Mayar Meashal al-Harbi**

**Supervised by Globe teacher**

**Aminah AL- ahmadi**

**Headmaster, Leila Al Hazmi**

**February 2022**

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**Extract:**

**Our research aims to find technical engineering solutions for the dry desert environment to reduce the intensity of air temperature, especially in summer.**

**We live in the Makkah region of western Saudi Arabia. It consists of valleys and hills far from the surface of the water, with little rain, heavy summers, warm winters, and low humidity.**

**In the past, people sprayed water on the ground and in the air to reduce heat.**

**As the technology progressed, they used different air coolers to get cold air inside buildings, resulting in water leaking out of the air coolers.**

**In order to preserve the environment and water, many people have collected and recycled this water, such as irrigating plants in gardens, watering animals, washing cars and gardens, and car coolers.**

**We conducted comparative experiments on a sample of tap water, air cooling water in terms of transparency, electricity, and PH. We found that air cooling water is opaque and is distilled water.**

**Here, we have two ways to drain air cooler water and use it to moisturize and purify the atmosphere. We collect air cooler water in containers or tank connected to a network of sprinkler fans and pump water and use it in manual spray fans and use it on a personal level or by connecting a spray fan to the water leaking place in air coolers and the electric-powered fan of the air coolers for air coolers to moisturize the atmosphere.**

**Keywords:**

**Fan spray - water air cooling devices - electric power -PH.**

## **Hypothesis and research questions:**

**This study aims to take advantage of the water of air-cooling devices in the soothing and purifying of the atmosphere (environmental engineering)**

**Climate.**

**We noticed a leak of water from air coolants.**

### **Hypothesis question**

**Can we recycle water leaking from cooling devices to cool and lower the ambient air temperature?**

**She asks us:**

- 1/ How can summer heat be reduced?**
- 2/ What are the properties of air-cooling device water?**
- 3/ Why does water come out of air coolers?**
- 4/ What is the difference between tap water- and air-cooling device water?**
- 5/ What is the damage to the leakage of air-cooling devices on buildings and the environment?**
- 6/ How do we benefit from the water of our air-cooling devices in our life?**
- 7/ Can air cooling device water be used to moisturize the atmosphere?**

## Introduction

**Makkah is the western region of Saudi Arabia and is very hot in summer and its climate is dry and hot in summer.**

**It is in a hot barren area and is surrounded by a large sandy area of deserts and little rain.**

**One of the main reasons for the problem of water shortages in Saudi Arabia is the geographical location.**

**Since ancient times, ancestors have sprayed dry land with water to reduce the heat of the air as water evaporates rapidly, to increase temperature and work relatively smoothing the atmosphere.**

**With industrial progress, the inhabitants of this area used electric-powered air-cooling devices, and their number swelled in buildings, schools, hospitals and markets, resulting in the loss of air-cooling devices outside buildings, causing damage to the environment.**

**The Government of Saudi Arabia has provided water spray fans (water fog poles) in the squares of the Makki, Al-Nabawi and Arafat's poetry to ease the hot weather and purify it from the dust on pilgrims and visitors.**

**The use of spray fans is only in open spaces such as squares of the most high-pressure air-softening arenas, where water is pumped under high pressure by a high-pressure pump from the water feeding station, which is available on the reservoir to save water and filters to purify water before entering the pumps, and the water comes out of the fans in the form of cold fog (thousands of cold water atoms) to reduce the air temperature from 5 to 7 degrees, in addition to putting out volatile dust.**



Photo (1) - Spray fans in Arafat

Through our research, we have identified the properties of air coolants: distilled water because of the condensation of water vapor in the air because of relative humidity, so we find that in the days of extreme heat in summer and with the relative high humidity we find that the amount of water formed is greater.

For example, 20 gallons of wasted air cooling water is enough to fill 91 bottles 1 liter or 15 6-liter bottles.

Chemistry professor Omar Al-Sa'idi stated that the water of air-cooling devices is polluted and undrinkable due to the presence of rust, minerals and bacterial and due to the importance of water wealth, man used wastewater in his environment and collected this water and used it in irrigation, washing cars, buildings, watering animals, etc.

One of the damages to the leak of air-cooling devices on buildings is that the wall of buildings absorbs the water falling from air cooling devices and affects the quality of the building and when it falls to the ground it becomes home to insects and bacteria.

We have suggested ways to solve this problem by either collecting water from air cooling devices and using them in hand-held and electric spray fans and using them on a personal or public level.

Here we have two ways to drain the water of air cooling devices and use them in humidifying and purifying the atmosphere, collecting water from air cooling devices in containers or tank connected to the spray fan pipe network and pump to pump water up, or use it to fill small-sized spray fans (personal use) or fill cooling devices that add water to them or by connecting a spray fan to the leaking place of water in air cooling devices and the fan works with electric power for devices Cooling the air in order to moisturize the atmosphere.

When building, we recommend the architect to develop a tank to collect water from air cooling devices.

We recommend that air-cooling plants produce air cooling devices connected to the water leak site with an external electric-powered spray fan for air coolants.

## Procedures:

To find out the properties of air-cooling device water and tap water, transparency and PH were measured.

## Experience:

### Comparison of air-cooling device water and tap water

#### Tools:

2 numbered glass cups - PH meter - transparency meter

Tap water - water air cooling devices

#### Steps:

1. We put 300ml of tap water in the glass cup and 300 ml of air-cooling water
2. We put a PH device to measure the pH of tap water and cooling device water
3. Measure transparency of water through transparency tube.

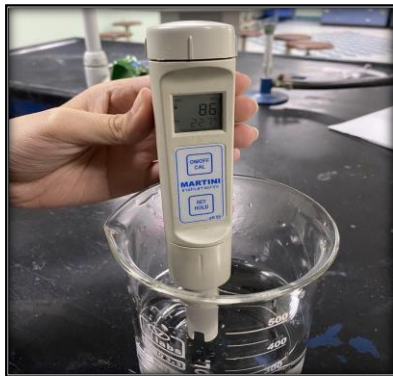


Photo (3) PH for air cooling device water

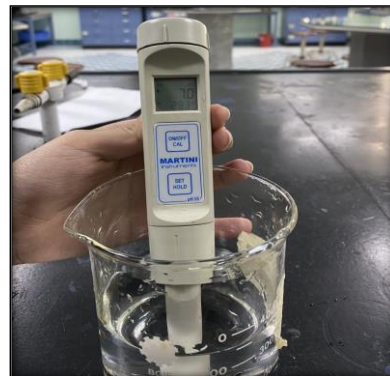


Photo (2) PH measurement of tap water

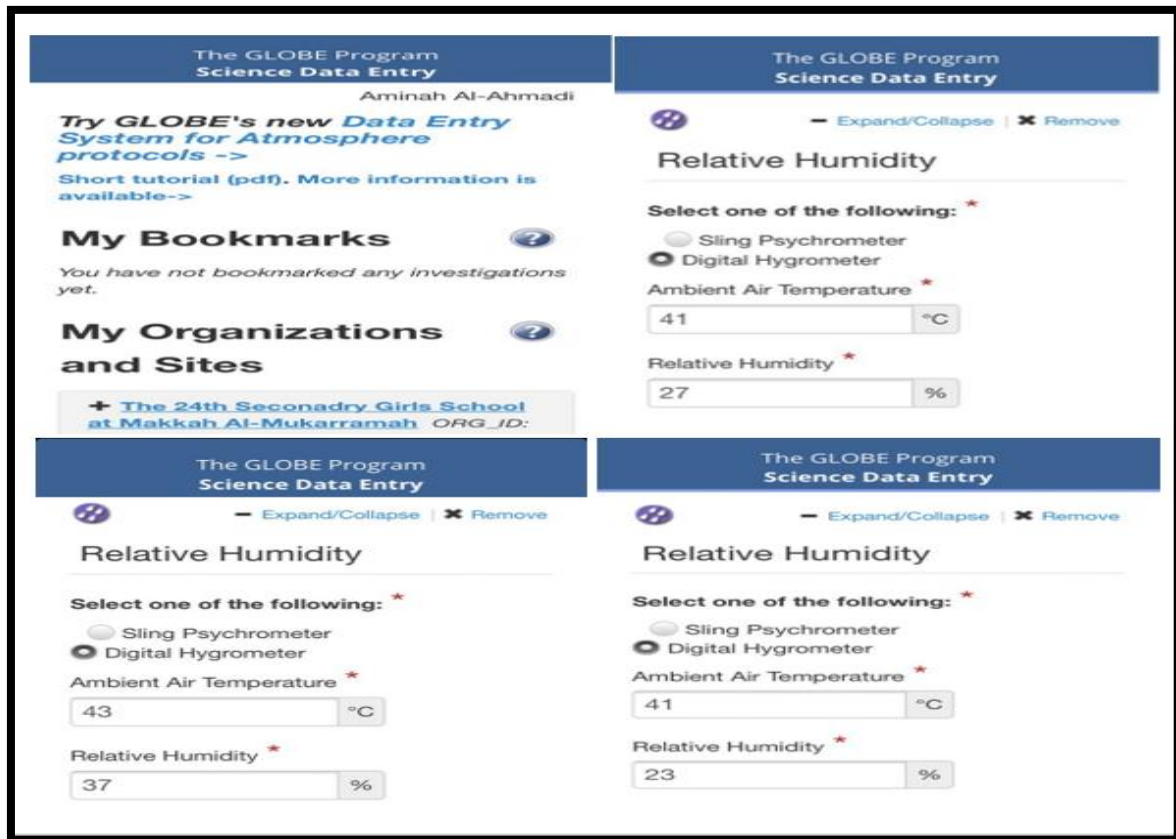


Photo (4) Measuring water transparency

**Study site:**

**By monitoring the atmospheric data of the study site (GLOBE page)**

**In summer [Jul, Aug, Sep] we notice high temperatures and low humidity.**



**Photo (5) Summer temperatures and humidity 1-7, 1-8, 1-9**



**Data collection and analysis:**

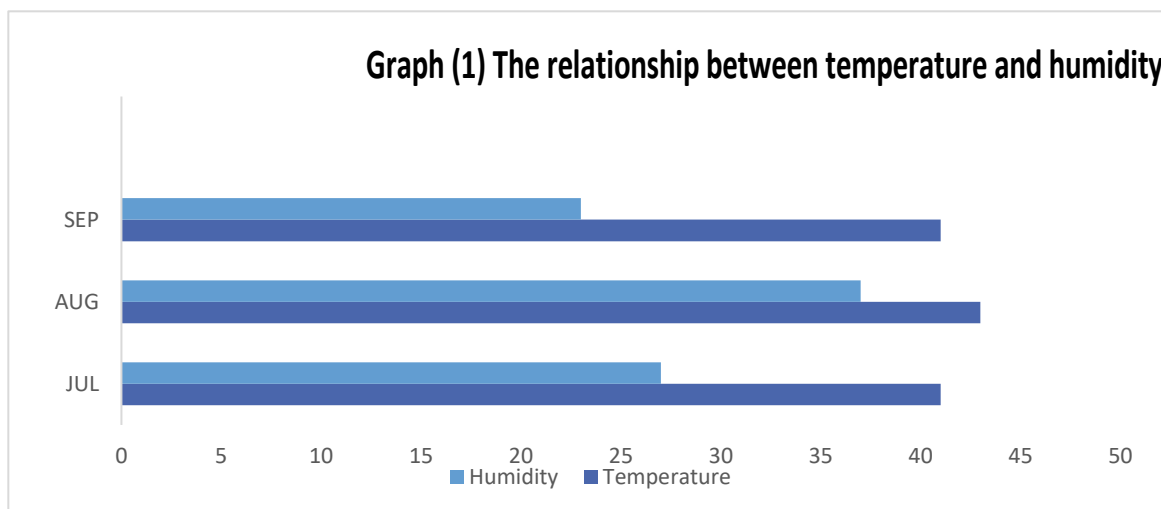
And we came up with through the experiment that

Water air cooling devices	Tap water	Properties
Opaque	transparent	Transparency
1.7	3.8	PH

Table (1) shows the difference between tap water- and air-cooling device water

We're learning from experience that the water of the air coolants is opaque, PH is even.

Tap water is transparent and PH alkaline so air cooling device water cannot be used for drinking and can be used outside the human body.



Through the graph we conclude that the inverse relationship between temperature and humidity

The higher the temperature in the summer, the less humidity, and the hot air.

### Discussion of the results:

Water plays an important role in the life of the organism, and we must preserve every drop of water.

A person needs a good climate to feel comfortable in his life.

Air-cooling water can be collected and used in various aspects of life but can only be used for drinking after purification.

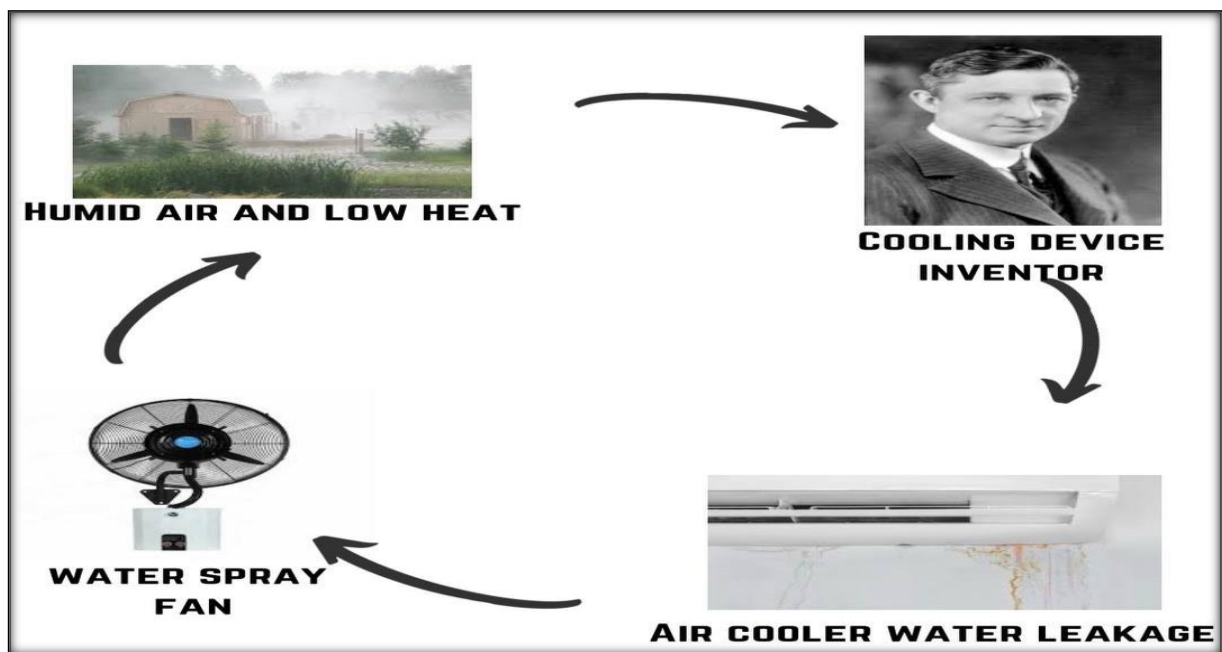


Photo (6) The relationship between weather change and air-cooling devices

**Thanks :**

**We thank everyone who contributed to this research with us.**

**I thank my father for their attention, and Globe teacher Aminah Al-Ahmadi,  
Math teacher Amal Al-Sa'idi, chemistry professor Omar Al-Sa'idi and school  
principal Leila Al Hazmi.**

## **Badges:**

### **collaboration**

**Globe environmental members at our school have collaborated to gather information, complete scientific research, and math teacher Amal Al-Sa'idi has helped us chart**

### **Community impact**

**The community cares about the importance of water and its rotation and cares about changing the weather and soothing the atmosphere to feel comfortable**

### **Contact stem specialist**

**We reached out to Professor Omar Al-Sa'idi, professor of chemistry, to learn scientific information for our research.**

### **With Globe Schools**

**Scientific expertise and information for scientific research have been shared with Globe Environmental Schools in our region.**

### **Engineering Solutions**

**We used tools in the Chemistry Laboratory and the Globe Environmental Laboratory.**

**Sources:**

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