

Investigating the impact of Alum in reducing the temperature of hot water and reducing waste in water and electricity

Saba First Secondary school

Abstract

The idea of research in the farm commenced where it was noted that some small ponds were formed and two ponds of them were characterized by cold water when watering the farm, although the water for irrigation is very hot temperature (40-50) .

How can this water be cold, even when pouring it is very hot, and how to take advantage of the property of reducing the temperature of hot water in homes to reduce the waste of water and electricity, and it is also noticeable that farm workers use alum for health purposes, they are grinding and then use it in the treatment of sheep in the farm to stop bleeding injuries caused by animal nails or wounds.

In this research, we started the search journey first from the farm to find out the cause of the coldness of the water. Is the water has a different source or is there a substance (Alum) found in these ponds is the cause of cold water?

By search and conducting experiments on water (solubility, pH and temperature), the use of GLOBE data sets and specifying the location of the places where the experiments were conducted to verify the validity of the results, we concluded that the alum is responsible for lowering the temperature and we found that the rate of drop in temperature is 13 degrees and is very suitable for solving the problem of hot water during Summer in homes when used in personal hygiene and thus stop .wasting in water and electricity

Research Question and Hypothesis:

The Question: What is the reason for the coldness of water in bonds of the farm, although the whole farm water is very hot (temperature of 40-50). How to take advantage of the coolness of hot water in homes, schools and others to solve the problem of too hot water and reduce wasting water in search of cold water.

Introduction to the problem of study:

In the farm owned by (MOHAMMED SALAH JERIBE) being located in Jazan province, Sabya city, Alhajariyah village where sheep are bred for the purpose of trading and personal interest as well. (Farm Site GPS) (Picture)

In hot weather days and when tap water is used (even indoors), it is very difficult to use it for personal hygiene and for watering animals because the water tanks and pipes are made of iron or plastic, which is heated a lot with high temperature ranging between 40-50 Celsius degree.

But it was noted in an area of this farm, specifically in the small garden of the farm (designated for workers) some small ponds are formed and two ponds of them characterized with cold water when irrigating the garden and farm although the water used for irrigation is very hot at a temperature of 50 degrees sometimes and its source is tanks made of iron which increases the heat of this water.

How can this water be cold though it is very hot at the time of pouring it, and it is also noticeable that these workers use alum for health purposes. They grind it in their garden and then use it in the treatment of sheep in the farm to stop the bleeding injuries caused by animal nails or wounds.

Materials and Methods:

In our study and for data collection, we communicated with the owner of the farm (Mr. AHMAD SHWEIHI) and the first secondary school for girls in Sabya and secondary school for girls in Al Farshah which are all located on the same latitude (images via GPS) and then we moved in three paths:

The first path: to ascertain the source of water whether it is the groundwater or water collected after the rain and certainty of these things was easy because in the same year the owner of the farm conducted a survey of the land through a specialized company to establish an artesian well and then the location of ponds not because of groundwater. Upon reviewing weather reports to track the latest rainfall, it did rain in the period 719 - 7115 to 9121 -9127, and then the source of the ponds is not rain.

The second path:

To make sure that Alum (hydrated potassium sulphate and aluminum with the formula $KAl(SO_4)_2 \cdot 12H_2O$) is the material responsible for water coolness and conduct measurements on water samples from the farm water and comparing it with water from the school (first secondary school for girls in Sabya) and then comparing it with farm measurements (AHMED SHWEIHI) and Secondary School for Girls in Al Farsha. We used Globe environmental instruments (temperature, pH, and solubility)

The third path:

To study the practical application for using these in homes, schools and institutions to solve the problem of water high temperature, which is an Arab national problem, as solving this problem stops waste water and maintenance (Note: when using the too hot water in summer season and to get the somewhat cold water, the person opens the tap and makes the water pour to the ground with large quantities to get rid of the hot water coming from the pipes and then use them) in addition to solving the problem of sewage and waste in electricity in case of using cold water from the fridge for personal hygiene.

Through procedures of the second path in this study, we conducted several experiments that included these experiments:

- 1) Test water solubility in water at temperature (25).
- 2) Experiments to measure the pH of the solution of water and alum.
- 3) Experiments to measure the drop in water temperature after melting the alum.



photo of Experiment 1

Result:

results and data of the first experiment (solubility of alum in 100 ml water)

pH of alum solution in water = 3.5

- Results and data of third experiment A (Farm water):

Trial	Initial temperature	Temperature after adding alum	Ratio of decline
1	50	37	13
2	45	32	13
3	43	28	15
4	40	28	12
5	43	32	10
6	45	30	15

- Ratio of decline: 13 degrees

- Results and data of third experiment (School water):

Trial	Initial temperature	Temperature after adding alum	Ratio of decline
1	43	29	14
2	44	31	12
3	43	30	13
4	49	37	12
5	50	38	14
6	45	32	13

Discussion:

How to use alum in water cooling. This can be done in two ways:

The first is to add alum powder to water in the storage tanks. Although the material is healthy as proven by the studies for external use, we hope to continue the studies to ascertain the feasibility of using it in the water storage and the specified percentages. This is a modest invitation for me to work in cooperation with the Ministry of Water and Health for that purpose. (My next research study will about that)

Second: Use an innovative product (like the one in the picture) by placing a filter (which can be changed from time to time) containing alum powder and provide the schools and houses with this product.

CONCLUSIONS:

From the previous results it is clear that we can rely on alum as a material to help reduce the temperature of water used personally and through previous research of the material we find that alum is suitable for external use and even healthy, and its use in the process of cooling water will reduce waste in water and electricity.