



The Effect of Water Salinity
Levels on Water Acidity (pH)
and Water Conductivity in
Jeddah

Intermediate gifted school
Jeddah / Saudi Arabia

2019

The Effect of Water Salinity Levels on Water Acidity (pH) and Water Conductivity in Jeddah

By: Lamar Yahya Tomahi

Gifted School, Intermediate Level

Jeddah/ Saudi Arabia

Supervisor: Hind Al-jehani

21 of January – 16 of March

Index:

1	Abstract	4
2	Key words	5
3	The Problem	5
4	Research Question	5
5	Hypothesis	5
6	Steps	6
7	Experiment tools	9
8	Results	10
9	Conclusions	14
10	Discussions	14
11	References	15
12	Thanks	16

Abstract:

Water is an important element of our life. It is composed of oxygen and hydrogen. Saltwater characteristics differ from fresh water. Seawater average salinity equal to 3.5%. The average of sea water density at the ocean surface is 1.025, which is higher than the fresh and pure water density because dissolved salts increase the mass of water. Some ions have a great precipitation velocity. The percentage of dissolved solids in seawater is much higher than that of freshwater solvents.

Conductivity is a measure of the water's ability to pass an electric flow. It decreases with increasing of salinity and increases with the increases of temperature. The pH is abbreviation of " power of hydrogen " and it measures the molten concentration of the hydrogen ions in the water.

The study indicates the effect of water salinity on the value of the conductivity and acidity (pH) and the relationship between them. In the study of this relationship, GLOBE devices were used: hydrometer (specific gravity), the alcohol thermometer (temperature), the conductivity meter, the pH meter as well as the salinity table. In the research experiment, the following were used: fresh, salt, pure water. This study showed several conclusions .

Key Words:

Water pH

Water salinity

Water conductivity

Problem: Study the effect of increased salinity on water acidity (pH) and conductivity

Research Question: Does increasing salinity level influence water acidity (pH) and water conductivity?

Hypothesis:

1. Increasing salinity level influence water conductivity.
2. Increasing salinity level does not influence water conductivity.
3. Increasing salinity level influence water acidity (pH).
4. Increasing salinity level does not influence water acidity (pH).

Time limits: 12:30

Place limits: Intermediate gifted school

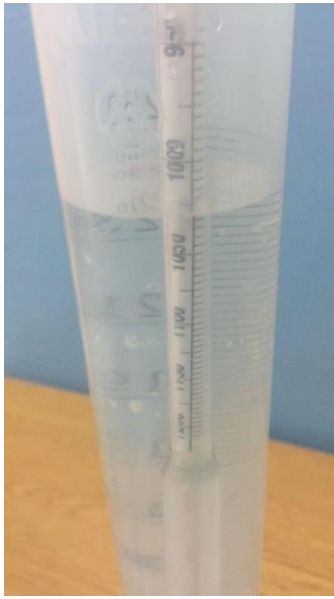
Steps:

1. Put 190 ml of fresh water in a glass tube and measuring the water temperature using alcohol thermometer and measuring water specific gravity using a hydrometer to find the level of salinity in the fresh water based on the table. Then, measuring water acidity using water acidity measuring device and the same for water conductivity level. Then, adding 190 ml of seawater into a glass tube and doing the same measurement as above.
2. In the first experiment, I add seawater to the 190 ml of fresh water and then I measure: water temperature using alcohol thermometer, water specific gravity using a hydrometer, water acidity and water conductivity. I noticed that salinity level increased while conductivity and water acidity decreased. In the second time, I added 60 ml of seawater to 190 ml of fresh water. Then, I did the same measurement as above. I noticed this time that salinity level increased and water acidity (pH) decreased while water conductivity remained stable. In the third time, I added 90 ml of seawater to 190 ml of fresh water. I did the same measurements of water temperature, acidity and conductivity as above. In the third experiment, I noticed that salinity level increased and water acidity decreased while conductivity remained the same. In the fourth time, I added 120 ml of seawater to 190 ml of fresh water. Then, I did the same measurements as above. I

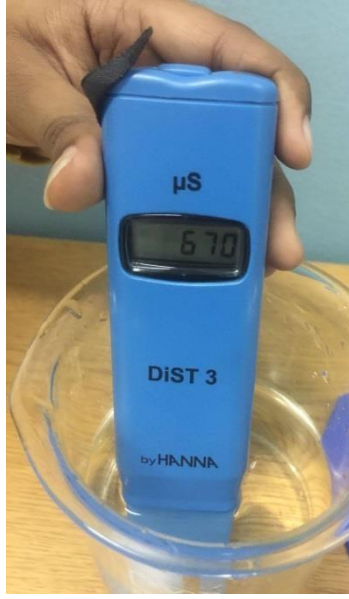
noticed this time that water salinity level increased and water acidity decreased while conductivity did not change. After repeating this 5-11 times, I noticed that water acidity reached a saturation level and did not change while conductivity remained stable in all the trials.

3. In the second experiment, I used pure water to verify the above results because seawater has ions that might influence the results. Therefore, I put 190 ml of fresh water in a glass tube I added 2 gm. of natural salt to 30 ml of pure water. And then I measure: water temperature using alcohol thermometer, water specific gravity using a hydrometer, water acidity and water conductivity. I noticed that salinity level increased while conductivity decreased while water acidity (pH) increased. In the second time, I added 60 ml of pure water and 4gm. of natural salt to 190 ml of fresh water. Then, I did the same measurement as above. I noticed this time that salinity level increased and water acidity (pH) increased while water conductivity remained stable. In the third time, I added 90 ml of pure water and 6gm. of natural salt to 190 ml of fresh water. Then, I did the same measurement as above. I noticed this time that salinity level increased and water acidity (pH) increased while water conductivity remained stable. In the fourth time, I added 120 ml of pure water and 8gm. of natural salt to 190 ml of fresh water. Then, I did the same measurement as above. I noticed this time that water salinity level increased and water acidity (pH) increased while conductivity did not change. In

the fifth time, I added 150 ml of pure water and 10gm. of natural salt to 190 ml of fresh water. Then, I did the same measurement as above. I noticed this time that water salt level increased and water acidity (pH) increased while conductivity did not change. After repeating this 6-11 times, I noticed that water acidity (pH) reached a saturation level and did not change while conductivity remained stable in all the trials.



4



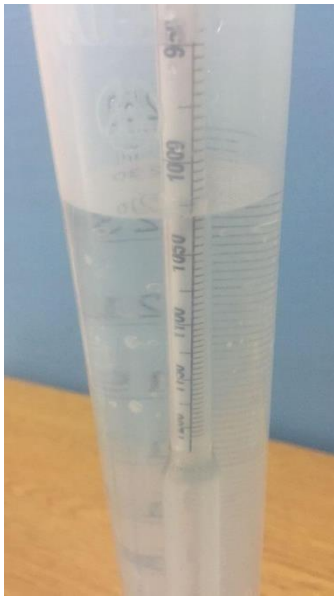
3



2



1



8



7



6



5

Experiment tools :

Water acidity measuring device, water conductivity value measurement device, salinity table, alcohol thermometer, hydrometer, pen and a paper, computer for data analysis, glass tube.

Results:

Trial	Fresh water (ml)	Salty water (ml)	Temperature (Celsius)	Specific gravity	Salinity	Water pH
1	190ml	0ml	24 _o	1000	3.2	9.1
2	190ml	30ml	24.5 ^o	1000	3.3	8.7
3	190ml	60ml	25 _o	1000	3.4	8.6
4	190ml	90ml	25 _o	1000	3.4	8.5
5	190ml	120ml	25.5 ^o	1000	3.7	8.4
6	190ml	150ml	26 _o	1000	3.8	8.4
7	190ml	180ml	26 _o	1000	3.8	8.4
8	190ml	210ml	26.5 ^o	1000	4	8.4
9	190ml	240ml	23 _o	1025	36	8.4
10	190ml	270ml	23 _o	1025	36	8.4
11	190ml	300ml	23 _o	1025	36	8.4

Table 1. The relationship between salinity and acidity

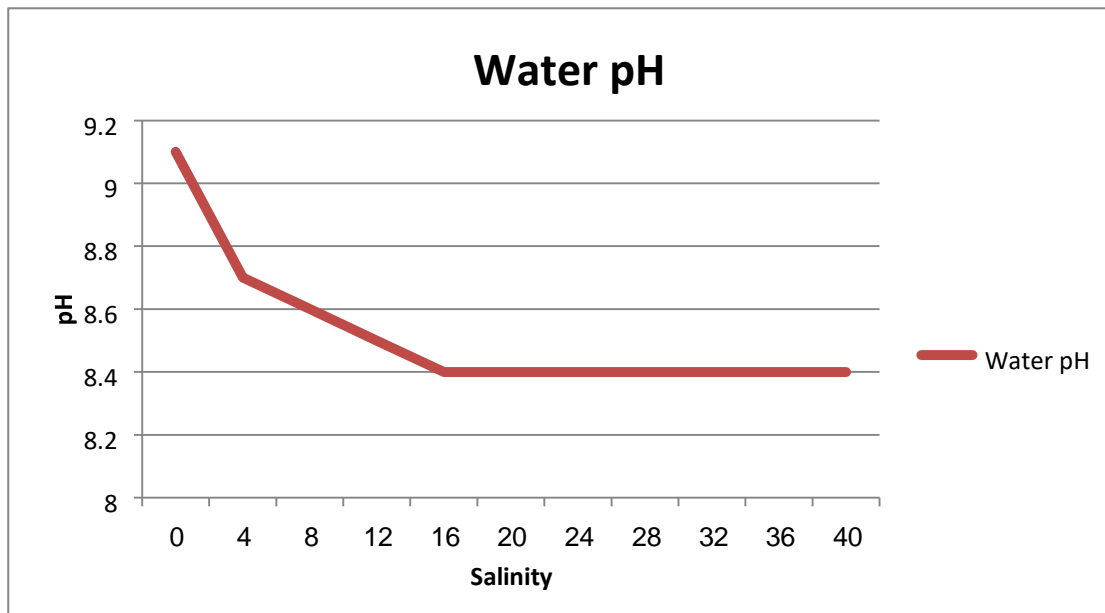


Diagram 1

Trial	Fresh water (ml)	Salty water (ml)	Temperature (Celsius)	Specific gravity	Salinity	Conductivity
1	190ml	0ml	24 ₀	1000	3.2	651
2	190ml	30ml	24.5 ⁰	1000	3.3	1
3	190ml	60ml	25 ₀	1000	3.4	1
4	190ml	90ml	25 ₀	1000	3.4	1
5	190ml	120ml	25.5 ⁰	1000	3.7	1
6	190ml	150ml	26 ₀	1000	3.8	1
7	190ml	180ml	26 ₀	1000	3.8	1
8	190ml	210ml	26.5 ⁰	1000	4	1
9	190ml	240ml	23 ₀	1025	36	1
10	190ml	270ml	23 ₀	1025	36	1
11	190ml	300ml	23 ₀	1025	36	1

Table 2. The relationship between water salinity and conductivity

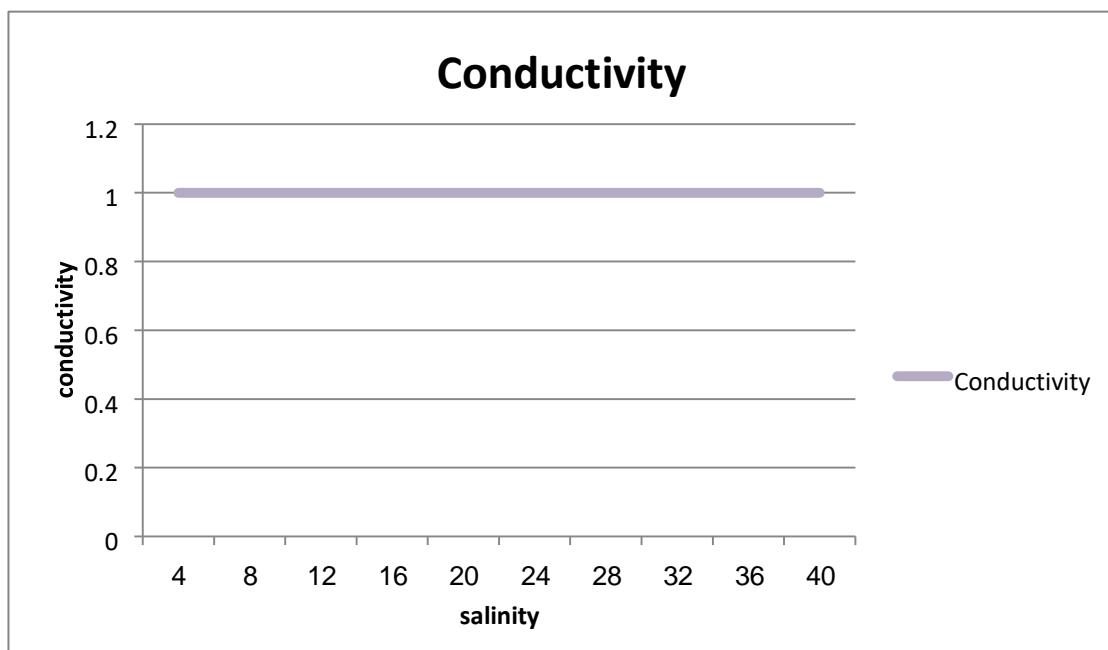


Diagram 2

Trial	Fresh water (ml.)	Pure water (ml.)	Added salt (gm.)	Temperature (Celsius)	Specific gravity	salinity	Water pH
1	190ml	0ml	3gm	24 _o	1020	29.8	8.6
2	190ml	30ml	3gm	24.5 ^o	1020	29.9	8.7
3	190ml	60ml	3gm	25 _o	1020	30.2	8.8
4	190ml	90ml	3gm	25 _o	1020	30.2	8.9
5	190ml	120ml	3gm	25.5 ^o	1020	30.3	9.0
6	190ml	150ml	3gm	25.5 ^o	1020	30.3	9.0
7	190ml	180ml	3gm	26 _o	1020	30.5	9.0
8	190ml	210ml	3gm	26.5 ^o	1020	30.7	9.0
9	190ml	240ml	3gm	27 _o	1020	30.9	9.0
10	190ml	270ml	3gm	27.5 ^o	1020	31.1	9.0
11	190ml	300ml	3gm	27.5 ^o	1020	31.1	9.0

Table 3. The relationship between salinity and acidity pH

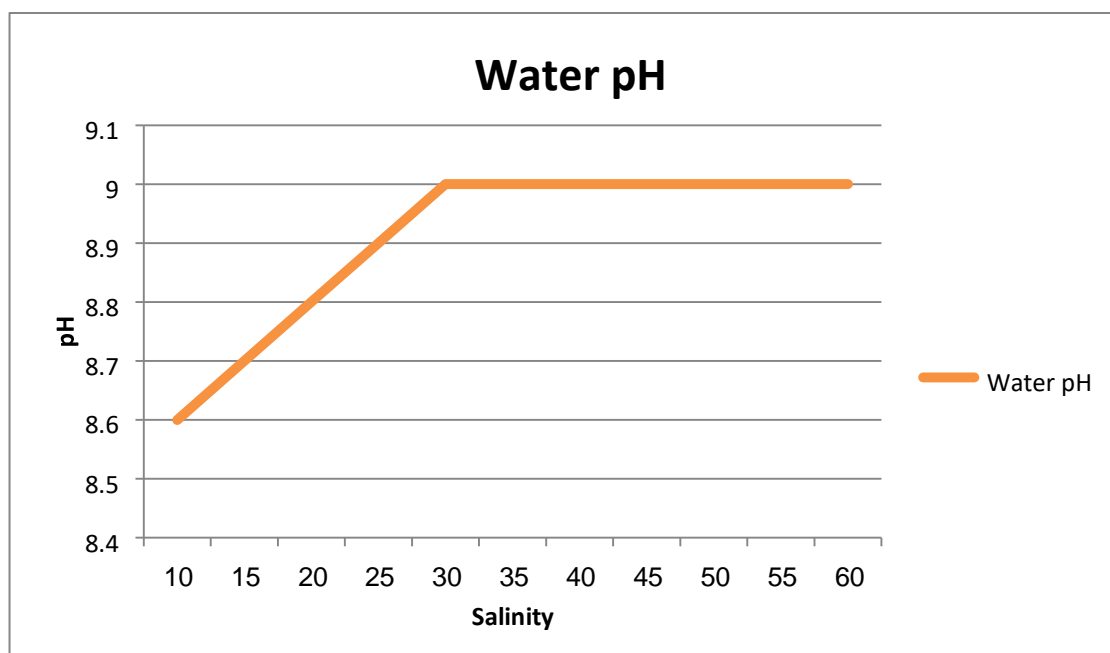


Diagram 3

Trial	Fresh water (ml.)	Pure water (ml.)	Added salt (gm.)	Temperature (Celsius)	Specific gravity	Salinity	conductivity
1	190ml	0ml	3gm	24	1020	29.8	651
2	190ml	30ml	3gm	24.5	1020	29.9	1
3	190ml	60ml	3gm	25	1020	30.2	1
4	190ml	90ml	3gm	25	1020	30.2	1
5	190ml	120ml	3gm	25.5	1020	30.3	1
6	190ml	150ml	3gm	25.5	1020	30.3	1
7	190ml	180ml	3gm	26	1020	30.5	1
8	190ml	210ml	3gm	26.5	1020	30.7	1
9	190ml	240ml	3gm	27	1020	30.9	1
10	190ml	270ml	3gm	27.5	1020	31.1	1
11	190ml	300ml	3gm	27.5	1020	31.1	1

Table 4. The relationship between water salinity and conductivity

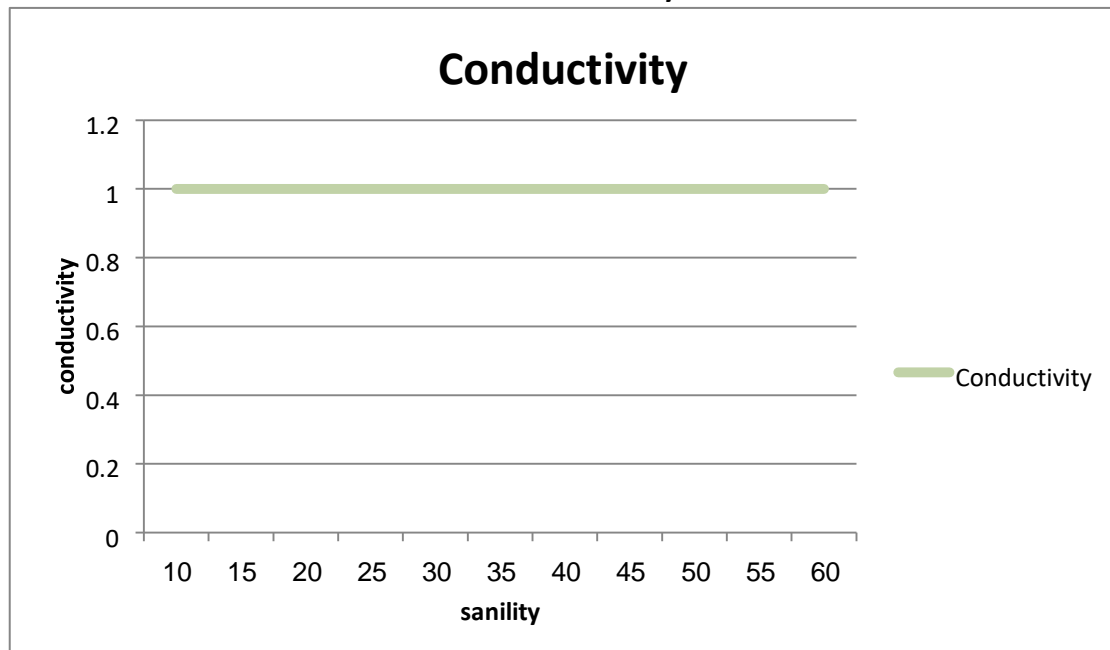


Diagram 4

Conclusion:

A- Diagram (1) shows that the increase of water salinity is inversely proportional to water acidity (pH). It was observed from experiment (5-11) that water reaches the status of saturation. Diagram (2) shows that increase of water salinity leads to the stability of water conductivity

B- In Diagram (3) there are different results, as the increase of water salinity is directly proportional to water acidity in case of using distilled water and salt to make the sample of salt water; it was observed from experiment (6-11) that water reaches the status of saturation, this could be due to the change of the percentage of the ions in salt water and the decrease of the of (pH) in water to 8, meaning, the medium is low alkaline. In Diagram (4), it was clear that the increase of salinity leads to the stability of water conductivity as in the previous experiment.

Discussions:

There are several studies that were concerned with water which proved that conductivity decreases whenever salinity of water increases, and increases whenever the water temperature increases. Further, they demonstrated that the ions existent in seawater influence the decrease of water (pH). The higher the water salinity, its acidity increases, such studies are in agreement with my current Study

References:

EPA. (2012). 5.9 Conductivity. In Water: Monitoring and Assessment. Retrieved from <http://water.epa.gov/type/rsl/monitoring/vms59.cfm>

2. Perlman, H. (2014). Electrical Conductivity and Water. In The USGS Water Science School. Retrieved from <http://ga.water.usgs.gov/edu/electrical-conductivity.html>

3. Miller, R. L., Bradford, W. L., & Peters, N. E. (1988). Specific Conductance: Theoretical Considerations and Application to Analytical Quality Control. In U.S. Geological Survey Water-Supply Paper. Retrieved from <http://pubs.usgs.gov/wsp/2311/report.pdf>

Globe program profile copy 2015

Thanks:

Thanks to my family for pushing me forward, to my teacher Mrs. Hind Al-jehani and Mrs. Manal Al-nami for guiding me, to my school for giving me their support, Globe for giving me the supplies, Dr. fatoon for her help and guidance.