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Mini Review

Use of Sea Water as Fertilizer

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Abstract

The use of sea water as fertilizer as well as irrigation water opens up new opportunities in not only the world economy but also agricultural areas. From this point of view, the use of sea water for this purpose remains an actual problem. As you know, nowadays the majority of world countries suffer from thirst.

Keywords: Osmos; Sea water; Water purification; Agricultural; Irrigation; Fertilization; Semiconducting membranes

Introduction

Therefore, in case the sea water is used as useful water source, it will contribute to the solution of some problems. Some countries in the world already use the sea water as a useful source of water. With this osmosis method, it is carried out under high pressure by means of semiconducting membranes. The disadvantage of this method is high energy consumption and the very large cost. Also, in some countries this method is based on the evaporation of sea water from salts and this causes high energy consumption. For this purpose, we can use solar energy in order to decrease energy consumption [1]. As you know, as a result of sea water analysis, the most harmful ions have been determined inside it. Meanwhile, sea water consists of large amount of harmful microorganisms for plants. That is why, it is the purpose to neutralize sea water both chemically and biologically.

For this purpose, in order to solve the problem, physical and chemical methods are utilized to make sea water useful.

First of all, lets get acquainted with ions that have been determined inside sea water as a result of analysis. This analysis was conducted upon MS-1669347-05-04 standard method (Table 1).

Table1

Results of chemical analysis of sea water			Equivalent value				
q/100q		Mq/l	Mq-ekv/l	Equivalent %	Property of water according to palmer		Additional Information
$Na^+ + K^+$	0.3978	4012.18	174.44	35.31	First salinity		Total roughness (mg-equi/l)
Ca^{2+}	0.032	322.78	16.11	3.26	S_1	70.62	Carbonate hardness (mg-equi/l)
Mg^{2+}	0.068	685.92	56.45	11.43	Second salinity		Constant roughness (mg-equi/l)

Sum of cations					S_2	27.45	
CI^-	0.6196	6249.91	176.29	35.69			
SO^2_4	0.3139	3166.31	65.96	13.35	First alkalinity		
HCO_3^-	0.0178	179.55	2.94	0.6	A	0	pH 7.7
CO_3^{-2}	0	0	0	0	Second alkalinity		
$RCOO^-$	0.0194	195.69	1.37	0.28	a	1.92	
$HB_4O_7^-$	0.0068	68.59	0.44	0.09			
Sum of anions			247				

Heavy Metals ICP-OES (inductively Coupled plasma-optical emission spectrometer)

The anions- the device CECIL 4004 spectrophotometer

Table 2:

	Ug.I^{-1}													
	Iron	Cadmium	Cobalt	Copper	Nickel	Lead	Zinc	Nitrites	Nitrites NO_{2+3}-N	Ammonia NH_4-N	Total nitrogen	Phosphates	Total phosphorus	Silicates SiO_2-Si
	Fe	Cd	Cobalt	Cu	Nickel	Pn	Zn	NO_2-N				PO_4-p		
Sample 1	<2	<0.02	<0.02	0.78	0.83	<0.1	0.97	<0.2	<10	<10	262	<1.6	2.4	42
Sample 2	4.2	<0.02	0.03	0.77	0.99	0.19	1.16	<0.2	<10	<10	366	<1.6	2	261
Sample 3	6.9	<0.02	0.035	1.09	0.8	10.3	4.23	<0.2	<10	30	330	<1.6	2.9	48
Sample 4	12.8	<0.02	0.035	0.59	0.88	<0.1	<0.8	<0.2	32	<10	375	<1.6	2.8	325

(Table 2) As shown in the table above, as sea water consists of large amount of CI^- and SO_4^{-2} ions, this prevents the use of water in plants [2]. Therefore, it is firstly required to neutralize or disable CI^- and SO_4^{-2} ions in the sea water.

It is conducted by doing the below mentioned conversions (equations).

$KCL+Pb(NO_3)2 == KNO_3+PbCL_2\downarrow$

$NaCL+Pb(NO_3)2 === NaNO_3+PbCL_2\downarrow$

$Na_2SO_4+Pb(NO_3)2 == NaNO_3+PbSO_4\downarrow$

$K_2SO_4+Pb(NO_3)2 ==== KNO_3+PbSO_4\downarrow$

As you see from reaction equation, Cl^- and SO_4^{-2} ions are released in the form of sediments, KNO_3 and $NaNO_3$ remains in water and by this way, we get nitrogen, phosphorus and potassium from sea water, which are the main nutrients for plants.

The rest of ions are both few and it is meaningless to neutralize them because this small number of ions are beneficial for plants [3].

The microorganisms in sea water are neutralized with special physical methods. We have already used the purified water we got and obtained really good results. As the rest of ions and the ions that entered into the environment as a result of reaction (NO_{3-}) are used as fertilizer, we can use sea water as fertilizer and from this point of view, we can utilize sea water both for irrigation and fertilizer.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

References

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