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SCHEMATIC STEPS FOR ARTIFICIALLY SALINIZATION OF WATER WITH DIFFERENT VALUES OF SAR.

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INTRODUCTION

Water salinity is considered as a world agriculture problem, at the same time, salinity degree and sodium adsorption ratio are the main two parameters used for classified the water from the agriculture view.

Studying the effect of water salinity degree (electric conductivity) conjugation with the effect of sodium adsorption ratio (SAR) demands waters with different degree of salinity, and so, within every salinity degree different levels of SAR. Naturally, these requirements is rarely found.

To overcome this problem the researchers mostly used artificial salinized water, so the writer introduced this helpful passage explaining that, How to salinize a water with a known SAR value.
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The constant 10 have a wide world acceptance for conversion the values of EC. In dSm^{-1} to meq L^{-1}, at the same time

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$ Each cation was calculated as meq L^{-1}

Suppose that, one wants prepare approx. 1 liter of water having an EC = 3 dSm^{-1} and SAR = 14, initially let us used the symbol x instead of Ca + Mg, so SAR equation becomes in the following form

$$SAR = \frac{Na}{\sqrt{\frac{x}{2}}}$$

To find out the simplest equilibrium equation between Na and X (Ca + Mg) in a water having a known SAR, put the SAR value = 14 as follow:

$$14 = \frac{Na}{\sqrt{\frac{x}{2}}} \qquad \therefore\ Na = 14\sqrt{\frac{x}{2}}$$

$$\therefore \sqrt{2}\ .\ Na = 14\sqrt{X} \qquad \therefore\ 1.414\ Na = 14\sqrt{X}$$

$$\therefore\ (1.414/14)\ Na = \sqrt{X}$$

Consequently we can say that, the relationship between Na and Ca + Mg in a water have a known value of SAR is described by this equation:

$$\frac{\sqrt{2}\ .\ \mathrm{Na\ meq\ L^{-1}}}{the\ value\ of\ SAR} = \sqrt{Ca + Mg\ (meq\ \mathrm{L}^{-1})}$$

(1.414/14) Na = $\sqrt{X}$ $\quad\therefore$ 0.101 Na = $\sqrt{X}$

(0.101 Na)^2 = ($\sqrt{X}$)^2 $\quad\therefore$ 0.0102 Na^2 = X

$\therefore$ 0.0102 Na^2 – X = 0.0 ……………..Eq. (1) in a water having SAR = 14

Previously we are supposed that, the researcher wants to prepare 1 liter of water having EC., 3 dSm^{-1} and SAR = 14, then, the total amount of salt in this liter is 3 x 10 = 30 meq L^{-1}.

$\therefore$ Na + X = 30 meq L^{-1}. where X = Ca + Mg

0.0102 Na^2 – X = 0.0 ……………..Eq. (1)
\+ Na + X – 30 = 0.0 ……………..Eq. (2)

0.0102 Na^2 + Na – 30 = 0.0 ……………..Eq. (3)
Eq. (3) x (1/0.0102)

= Na^2 + 98.039 Na – 2941.17 = 0.0 ……………..Eq. (4)
(Na – 24.08373) (Na + 122.12273) = 0.0

$\therefore$ Na – 24.08373 = 0.0 $\quad\therefore$ Na = 24.08373 meq L^{-1}
and the another case is not acceptable (Na = – 122.12273).
Then Ca + Mg = X = 30 – 24.08373 = 5.91627 meq L^{-1}

$$SAR = \frac{24.08373}{\sqrt{\frac{5.91627}{2}}} = 14.0028$$

After the amount of Ca + Mg be known (meq L^{-1}), the researcher can be divided these amount between these two cations as he need. The amount of each cation (sodium, calcium, and magnesium) meq L^{-1} multiplies with the equivalent weight /1000 of the salt which is used as a source of this cation to gave salt weight (gram).

The salts weight are dissolved in 70% of the water (which is used in calculation previously, then immersed the EC. meter electrode in the solution and read the EC. value, slowly, add water as request to reach the desirable value of EC.).

Tap water can be used instead of distilled water to prepare the salinized water, after it's analyzed and subtracted the amount of each cation (Na, Ca and Mg) from it's amount must be found in the water.

By this way one can prepare any volume of water (the final volume of water is measured by determining the EC. value with gradually addition of water to reach the desirable value because the electric conductivity value will be differ by differing the percentage of each salt and so, by accompanied anions) and the dilution of any water will reduced EC. value but will not change the SAR.