

IONIC STRENGTH VALUATIONS AT 481 BRAZILIAN NATURAL MINERAL WATERS

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Abstract

Much of the biological and aqueous solutions related to life have low content of dissolved salts or low ionic strength. Thus, research on the ions effectiveness, together or individually, demonstrate that the protein solubility increases in the solutions of low ionic strength. For example, experiments with lysozyme reveal that at pH 4.5, the solubility is strongly dependent on the solubility of anions and also that, at pH 9.5; it becomes independent of the ionic strength of the medium (Sastre de Vicente, 2004).

The 481 natural mineral waters hydro chemical analysis sampled from Brazilian fountains, was evaluated for TDS (total dissolved solids), Cl, Na, Ca, SO₄, Mg, K, HCO₃, F, pH, Fe, Si and T (temperature oC) (Lazzerini, 2013). Through Aq.QA Software (ROCKWARE, 2006); the activity coefficients of each species in solution has an activity coefficient Y, and calculated. The solution's ionic strength is determined in molal units by summing over the charged inorganic analyses. Using CORREL Excel Software function, the activity coefficient Y, was correlated with other chemistry features. And these results were compared with SPA balneotherapeutics waters from Carpathian Basin – Rabka region/POL (Rajchel et al., 2012; Wator et al., 2020).

Being able to observe, the Y minimum value 0,0000146 and maximum 0,2148065 (Table 1); compatible with Poland measures, positive correspondence with the traditional health tourism places and mainly statistic correlated values with TDS concentrations. Other ordered physic-chemistry properties correlated: Cl (0,795144), Na (0,79033), Ca (0,663681), SO₄ (0,630044), Mg (0,555108), K (0,489449), HCO₃ (0,389472), F (0,298549), pH (0,293622), Fe (0,184172), Si (0,166061), and T (0,133724).

Thus, possible support future research on ions that build or add structures in proteins are called kosmotrops (predominantly hydrophobic effect where there is the decrease of the dependence of solubility of proteins to the value of the ionic strength = "salt out") and those who destroy or solubilisation such structures are the chaotrops (dominant electrostatic effect leads to increased dependency of solubility of proteins with the ionic strength = "salt in").

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Table 1.

FOUNTAIN	Y	TDS
São Miguel PQB/GO	Min: 0,0000146	2,7
Cachoeira Dourada/GO	Max: 0,2148065	10343,7
481 Y CORREL	1,0	0,921189
Rabka SPA/POL	0,017 – 0,878	1200 - 49400
Carpathian Basin/POL	0,05 – 0,85	

Key words: Natural mineral waters, Ionic strength, Bioactivity, Balneotherapy.