

## Behavior of some chloride, carbonate, phosphate, sulphate and borate additive salt–NaCl aqueous solution systems in the absence and presence of NaF

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### ABSTRACT

The objective of this investigation focuses to the behavior of the contact of some seawater's constituents in both untreated discharged waters that fall along the coastal zone, and seawater in absence and presence of high fluoride concentrations. Fluoride is classified as one of the hazard contaminants for marine ecosystem when its concentration exceeds the range of 1.2–1.5 mg/l for unpolluted seawaters. The pH change in twelve aqueous systems containing additive salts (CaCl<sub>2</sub>, MgCl<sub>2</sub>, KCl, NH<sub>4</sub>Cl, NaHCO<sub>3</sub>, Na<sub>3</sub>PO<sub>4</sub>, Na<sub>2</sub>SO<sub>4</sub> and B(OH)<sub>3</sub>; known by their interfering properties among fluoride ion in seawater) and sodium chloride was followed in absence and in presence of sodium fluoride. Different concentrations of additive salts (similar and higher to seawater composition) were used to represent the behavior of these constituents in seawater and in the discharged water when they contact with the high fluoride concentration. Ca(OH)<sup>+</sup>, CaF<sup>+</sup>, Mg(OH)<sup>+</sup>, Mg(OH)<sub>2</sub>, MgF<sup>+</sup>, K(H<sub>2</sub>O)<sub>4</sub><sup>+</sup>, NH<sub>4</sub>(H<sub>2</sub>O)<sub>n</sub><sup>+</sup>, NH<sub>4</sub>F, Na<sub>2</sub>CO<sub>3</sub>, HCO<sub>3</sub><sup>-</sup>, NaSO<sub>4</sub><sup>-</sup>, B(OH)<sub>4</sub><sup>-</sup> and BF<sub>4</sub><sup>-</sup> species were formed in the studied systems. The concentration of the formed species and their equilibrium constants and solubility products were calculated. The results refer to the primary possible prediction of the formed fluoride species with the constituents of seawater along the coastal zone that is subjected to different huge discharged fluoride compound. Recalling that, some of these compounds are documented by their adverse effects on marine ecosystem.

**Keywords:** Twelve additive salt–NaCl aqueous solution systems; Sodium fluoride; pH change; formed species; equilibrium constant; solubility product

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