Calculation of pH in Fresh and Sea Water Aquaculture Systems

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The method developed is based on the solution of the full alkalinity-pH equation. Because of the need for simplification of the equations to yield explicitly solvable polynomial equations, the accuracy of the solutions depends on the simplification made and varies with water properties. Three simplifications are tested based on a second-, a third- and a fourth-order polynomial equation for hydrogen ion concentrations. The equations have been tested for salinities ranging from 0 to 35% fresh to sea water, for temperatures ranging from 0 to 35°C, for total carbonate carbon concentrations of 0.1 and 5.0 mmol/liter, and for total ammonia nitrogen concentrations of 0 and 10 mg/liter. Approximations are most accurate in waters of high total carbonate carbon and low ammonia concentrations, where the fourth-order approximation yields results that are within 0.05 pH units for the full range of pH values tested (5-10).

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