ABSTRACT

The owner of a decorative fish aquarium requires care because the aquarium's water pH tends to decrease due to fish waste and leftover food, which can release acidic ammonia substances, causing the pH of the water to drop. Previously, pH regulation in the aquarium was done manually and required more time. In this study, the ornamental fish used is the Oscar fish, which requires a slightly more alkaline pH of 7.5. This research aims to automate the control of the aquarium water pH using a PID (Proportional Integral Derivative) controller with the Cohen Coon tuning method to achieve a rapid system response. The system will operate when the pH sensor reads a value less than 7.5, the DC pump will release the alkaline fluid, and it will stop when it surpasses 7.5. Prior to testing, the pH sensor is calibrated as an input. The accuracy level of the sensor after calibration is 99.76%. In the designed system without using PID, the obtained values are Kp = 17.981, Ki = 0.0695, Kd = 2.148. These Kp, Ki, and Kd values will be input into the program to obtain the PID values. In the analysis of the time response, the settling time value is ∞, the rise time is 37 seconds, the overshoot is 13.4, and the steady-state error is 13%. In the PID system, the integral constant significantly helps to reduce the level of system overshoot. The PID-controlled system has a steady-state error value of 0.013%, an overshoot value of 0.07%, a rise time of 14 seconds, and a settling time of 241 seconds. Based on the obtained time response analysis, the PID-controlled system is far superior compared to the system without PID..

Keywords: *Ornamental Fish,* Akuarium, *PID Control, pH SKU:SEN0161 Sensor*