

Objetives

- This work is aimed to develop chemical detection systems for some of the ions, such as nitrate, nitrite, or iron,
- Adapting simple, robust and inexpensive electronic circuits for their monitoring, in order to achieve concentrations in real time.

Results

- The results displayed on figure 1 and 2, were obtained by a sensor Network without wires [4].
- A testlab kit was used to quantify the nutrients, on figure 3 shows one of the procedures [5], and respective measurements are found in figure 4.



Figure 1- Interface for graphical visualization of Humidity values. [4]

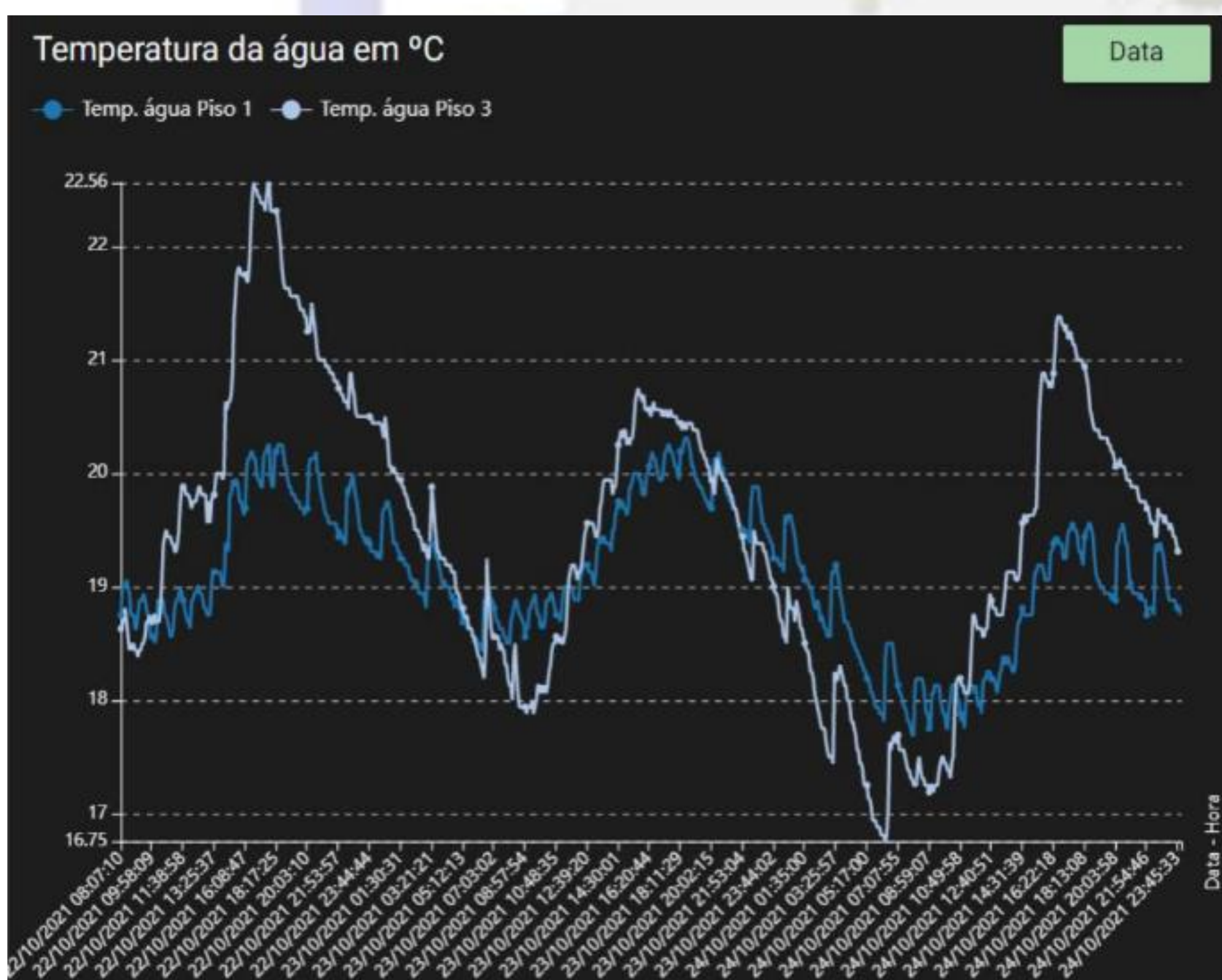


Figure 2- Interface for graphical visualization of water temperature values. [4]

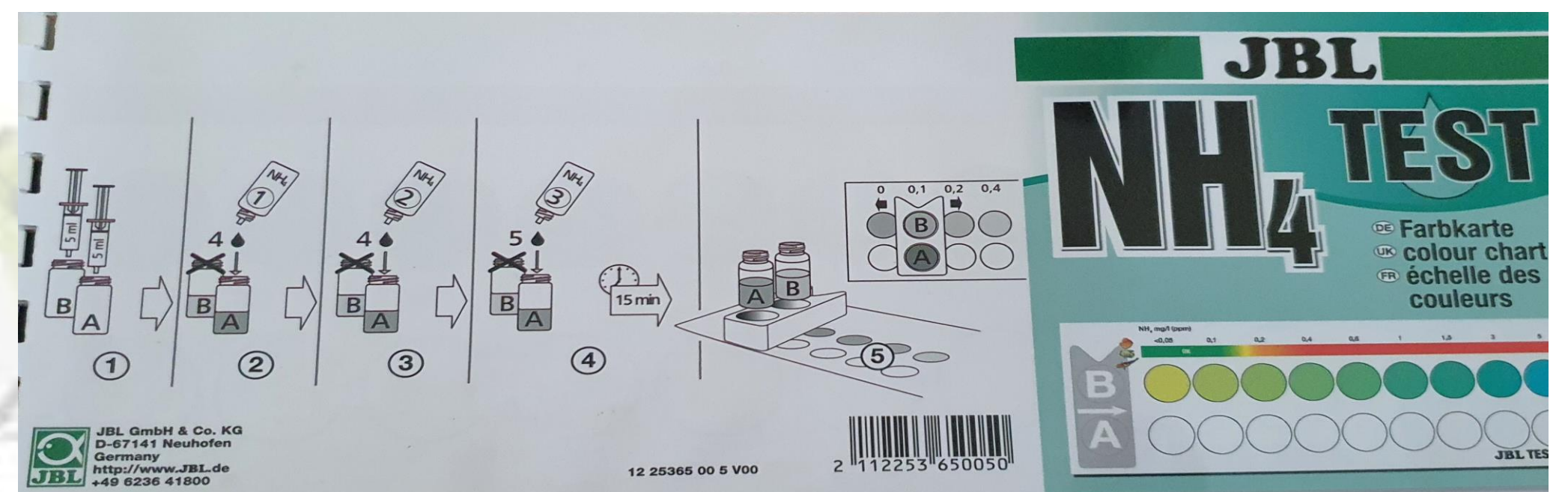


Figure 3 - Exemplification of the quantification of ammonium using the testlab kit [5].

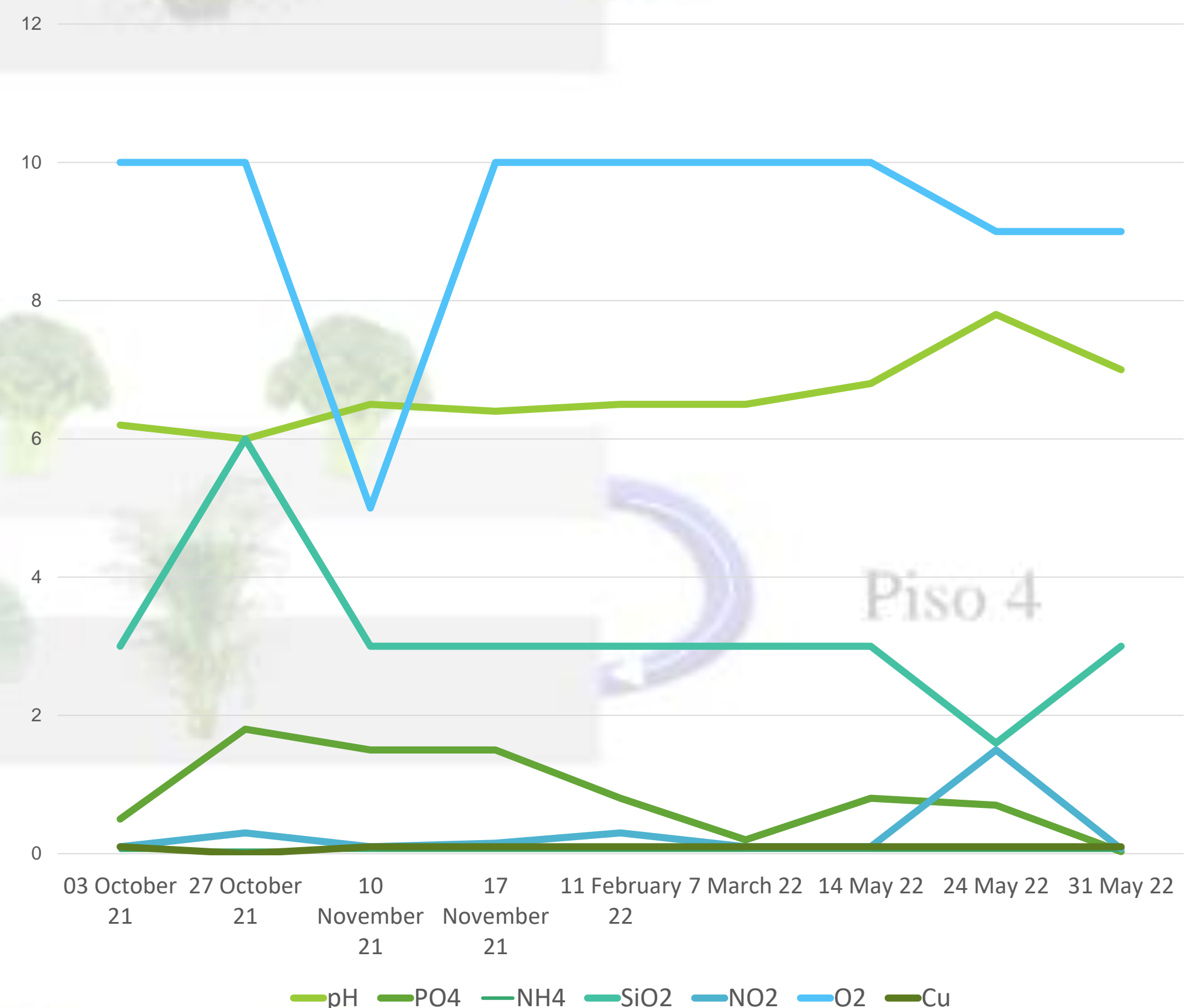


Figure 4 - Evolution of nutrients [5]

Discussion

- The wireless sensor Network was created to deliver in real time information about certain properties of the aquaponics system, such as the levels of humidity, luminosity, temperature and flow of water [4]. This information can help us understand which ones are at fault so we can act on and solve the issue.
- Besides the wireless sensor, it was used a testlab kit in order to collect data of the nutrients present on the system such as PO_4 , NH_4^+ , SiO_2 , NO_2 , O_2 and Cu. The issue is, that the kits are not able to give accurate values, which can lead to an increase difficulty on controlling the system has well putting the fish's lives at risk.

Future

- The main goal is to create chemical colorimetric sensors and implement them to a wireless system, similar to the one used to measure humidity and others, allowing to quantify nutrients in real time, securing the desired concentration and simultaneously preventing a toxic environment for the fishes.

References

- [1] C. Somerville, M. Cohen, E. Pantanella, A. Stankus, A. Lovatelli, 2014, "Small-scale aquaponic food production: Integrated fish and plant farming", FAO. <https://www.fao.org/3/i4021e/i4021e.pdf>, consulted on May 8, 2023.
- [2] T. Kyaw, A. Ng, 2017, "Smart Aquaponics System for Urban Farming", Energy Procedia, Volume 143, 342-347, ISSN 1876-6102. Doi: 10.1016/j.egypro.2017.12.694.
- [3] M. Krastanova, I. Sirakov, S. Ivanova-Kirilova, D. Yarkov, P. Orozova, 2022, "Aquaponic systems: biological and technological parameters", Biotechnology & Biotechnological Equipment, 36:1, 305-316. Doi: 10.1080/13102818.2022.2074892.
- [4] Frederico Alcides Marques dos Santos Pereira, October of 2021, "Implementação de Rede de Sensores Sem Fios para Monitorização e Controlo de Sistema de Aquaponia", master's thesis.
- [5] JBL, TESTLAB, PROFESSIONAL TESTING LABORATORY.