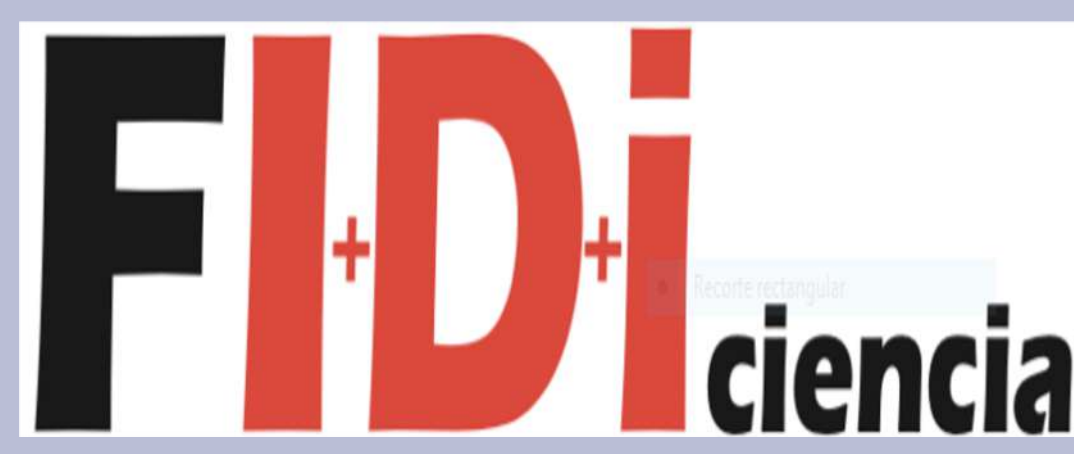


ANALYSIS OF THE AMOUNT OF NITRATES IN DIFFERENT TYPES OF WATER



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INTRODUCTION

Nitrate is an ion made up of three oxygen atoms, one nitrogen atom and a negative charge. Nitrate is a common contaminant found in groundwater and can cause harmful effects if ingested in large quantities. It has no colour or flavour and is found in nature in both surface and groundwater due to the water cycle

Excessive use of nitrogen fertilizers in agriculture and subsequent trawling through rainwater or water used for irrigation, has made them accumulate in certain areas. Industrial waste has also helped to accumulate nitrates in the water.

Excess nitrates cannot be absorbed by plants and reach groundwater contaminating aquifers from where they can pass into a drinking water source

Nitrates in high amounts are non-toxic, kidneys can eliminate them. The problem is that in certain organisms (people with gastric problems and children) nitrate oxidizes in nitrite, which is absorbed by erythrocytes, oxidizing the iron from hemoglobin and therefore preventing them from carrying oxygen. In addition, certain gastrointestinal cancers have been associated with excess nitrite in the waters. For that reason, in order for an aquifer to supply a population it is mandatory that it contains less than 50mg/l of NO₃-

The amount of nitrates we ingest in bottled water or tap in our daily consumption, which will allow us to make decisions about the type of water most beneficial to health.

OBJECTIVE

The objective of this research is to try to figure out the amount of nitrates found in the water consumed daily and in stagnant water. Five different types will be tested (pond, bottled (with gas and still), tap water, and sun for 4 days).

METHOD

- The test tubes are filled with 5 ml of water, with the aid of the pipette.
- Once we have the samples we add 5 drops of reagent 1 to the inside of the tubes and mix.
- Then we add 1 microspoon of reagent 2 and shake the inner tube for 1 minute.
- After the time has elapsed, we compare and check with the colour scale.

MATERIALS

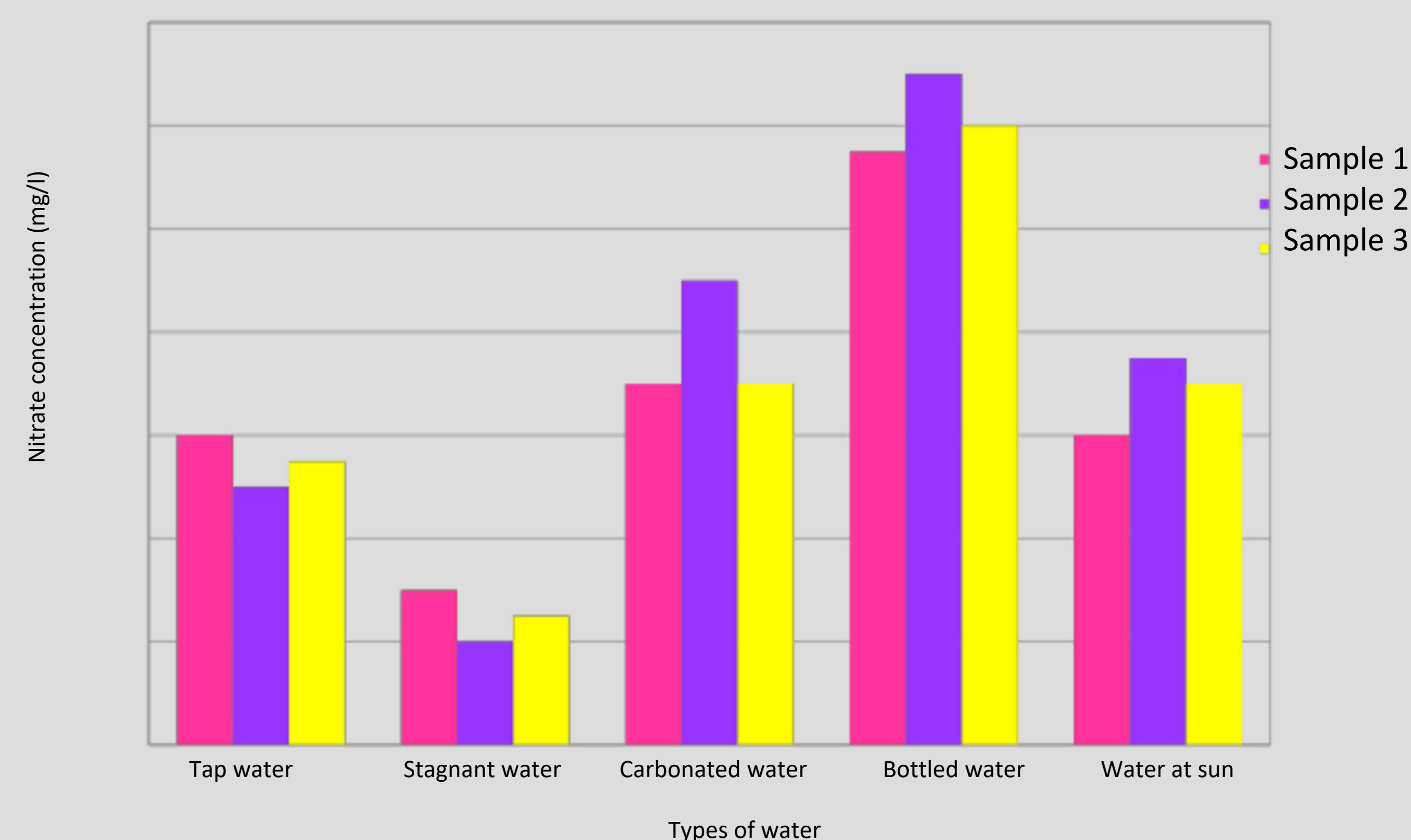


Image 1: Materials used. Racks, test tubes, types of water and reagents for nitrate determination can be observed.



Figures 2 and 3: Nitrate test

RESULTS



As can be seen in the graph, bottled water has the highest amount of nitrates, being slightly lower when bottled sparkling water is used. It is noteworthy that tap water contains lower amounts of nitrate than bottled water. In both cases, the levels obtained were higher than the FAO/WHO recommendation of 50 mg/l. In the analysis of the contaminated water, the amount of nitrate in the water exposed to the sun was higher than in tap water, probably due to the effect of water evaporation, which increases the concentration of dissolved ions in the water.

The stagnant water presented a surprisingly low amount of nitrates with respect to tap water (without contamination). There are studies (Rodríguez et al , 2012) that determine that low nitrate concentrations are usually accompanied by high concentrations of bacteria, so we support the values obtained in this analysis in these studies. Thus, the growth of bacteria means that nitrate levels in contaminated water are lower than in unpolluted water such as drinking water from the tap.

AMOUNT OF NITRATES

- Tap water - 55 mg/l NO₃⁻
- Stagnant water - 25 mg/l NO₃⁻
- Sparkling water - 77 mg/l NO₃⁻
- Bottled water - 122 mg/l NO₃⁻
- Water at sun - 68 mg/l NO₃⁻

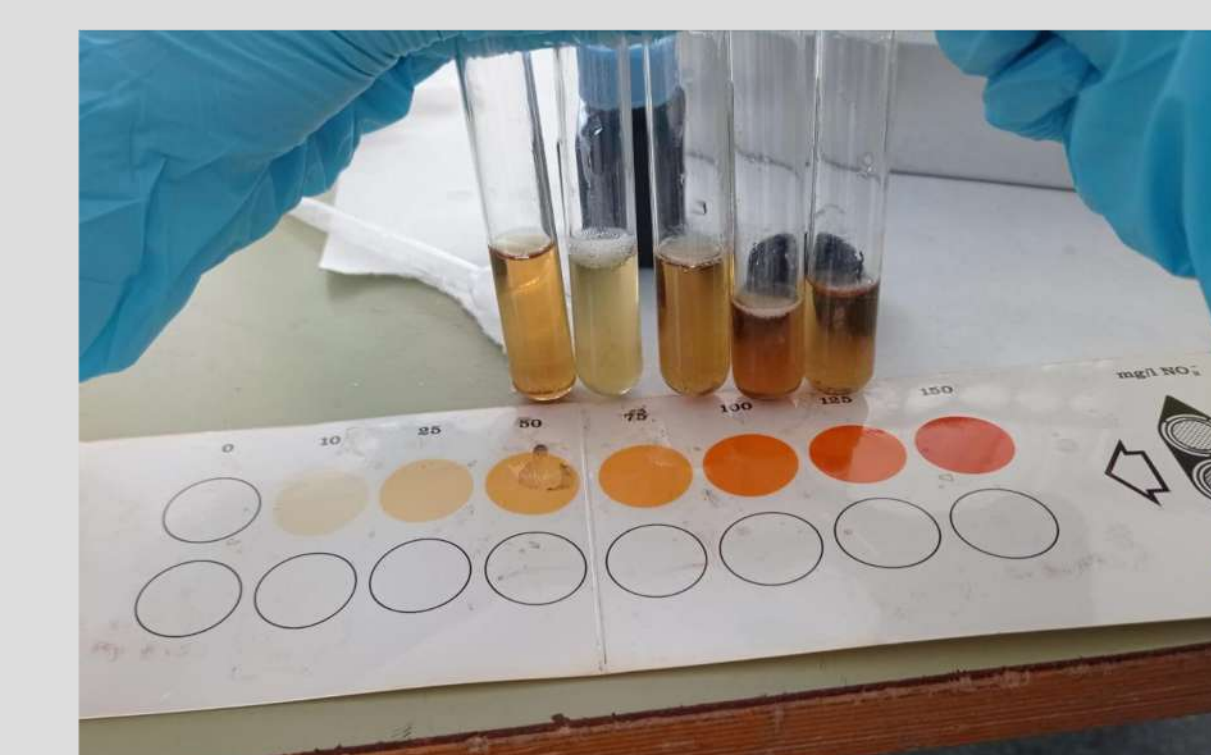


Figure 4: Reference color scale in the nitrate test.

CONCLUSIONS

1. The amount of nitrates in tap water is within the limits established for human consumption.
1. Bottled water, both sparkling and still, has a high amount of nitrates and exceeds the amount recommended by the WHO. It is also higher than that analyzed in tap water, so we recommend drinking tap water preferably.
1. The amount found in carbonated bottled water was lower than that found in still water due to the reactivity of the CO₂, incorporated into the carbonated beverage, with the nitrate present in the water.
1. The presence of bacterial contamination is related to a decrease in the amount of nitrates.
1. In water exposed to the sun, nitrate levels are higher than in tap water, probably due to the evaporation of the latter.

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