

# The Nutrient Analysis Laboratory of the Institut de Ciències del Mar of Barcelona (CSIC): a service for the marine water quality study

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## SUMMARY

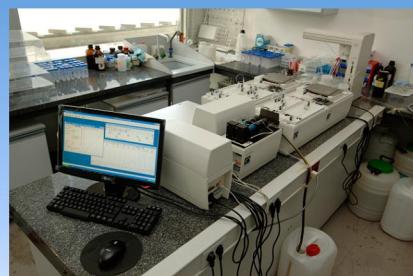
The characterization of the **chemical composition of the seawater is crucial for the understanding of many processes** occurring in the **marine ecosystems**.

Thus, the concentrations of **inorganic and organic nutrients** are estimated in most studies conducted by the scientists of the Institut de Ciències del Mar of Barcelona (ICM, CSIC) in a variety of areas (e.g., **Mediterranean, Atlantic, Arctic and Antarctic seas**).

These chemical analyses are performed at the "**Nutrient Analysis Laboratory**", included in "Scientific and Technical Service" **of the ICM**, created **to support research**. In addition, the Service has and will contribute to provide data for the characterization of the quality of the Catalan coastal waters, in collaboration to the **public administration**.

Here we show the main characteristics of the "Nutrient Analysis Laboratory". **Our interest is to warrant results reliability** by supervising methodological aspects and participating on international calibration exercises. It is also essential to us to be in **fluid communication with the scientists in order to progress** into the chemical analysis of the seawater.

## INORGANIC NUTRIENTS



AA3 High Resolution Bran-Luebbe

- Automated segmented flow analysis
- Photometry: Nitrate, nitrite, phosphate, silicate, Total Nitrogen and Phosphorus
- Fluorometry: Ammonia

Parameter	Measuring lowest range	Method Detection Limit	Accuracy (CV, %)	Method Reference
Phosphate	0 – 6,5 µM	0.020 µM	0.2 %	Murphy & Riley (1962)
Silicate	0 – 6 µM	0.030 µM	0.5 %	Koroleff (1961)
Nitrite	0 – 2 µM	0.003 µM	0.2 %	Shinn (1941)
Nitrate+Nitrite	0 – 21 µM	0.015 µM	0.21 %	Grashoff (1971)
Ammonia	0 – 5 µM	0.017 µM	0.2%	Kérouel & Aminot (1995)
Total Phosphorus	0 – 200 µg/L	1.1 µg/L	0.6%	Koroleff (1977)
Total Nitrogen	0 – 20 µg/L	2 µg/L	1.6%	Koroleff (1969, 1973)
Dissolved Organic Carbon (DOC)	4 – 25 g/L (ppm)	50 µg/L (ppb)	1.5%	Álvarez-Salgado & Miller (1998)
Total Nitrogen	0 – 4 g/L (ppm)	5 µg/L (ppb)	3%	Álvarez-Salgado & Miller (1998)

## ORGANIC NUTRIENTS



Shimadzu TOC-VCSH+TNM-1+ASI-V

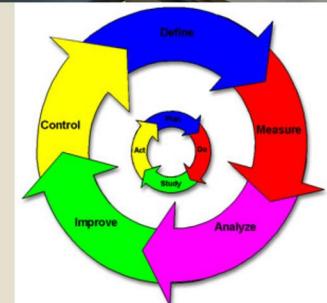
- High temperature combustion and catalytic oxidation
- DOC: by infrared detection
- TN: by chemiluminiscence



## OUR WAY OF WORKING

### 1) Quality above quantity: Quality control

- Bran-Luebbe – SEAL Analytical (Germany): EPA Procedure #136B, Certified
- Shimadzu (through IZASA): EPA Procedure
- Water Purification System Millipore: Calibration (26/03/2010) and Calibration #L C 0043/0171
- Eppendorf pipettes: Certified Calibration (ISO 8655; ENAC:BC 240610/34;)
- Sartorius balances: ISO 8655: ES 0490-336-031010
- Certified Reference Material for DOC and TN measurements: Dr. Hansell and Dr. Chen, University of Miami (US)
- Intercomparisons with international laboratories (e.g. QUASIMEME; Quality Assurance of Information for Marine Environmental Monitoring in Europe")



### 2) Continuous communication with the scientists and all the other users

### 3) Optimization and renovation of methods and equipments

## SOME USERS:

- Institut de Ciències del Mar de Barcelona (CSIC)
- Centre d'Estudis Avançats de Blanes (CSIC)
- Departament d'Ecologia, Facultat de Biologia (UB)
- Departament d'Enginyeria Química, Facultat de Químiques (UB)
- Agència Catalana de l'Aigua (Generalitat de Catalunya)
- IRTA (Generalitat de Catalunya)
- INDUROT – Universidad de Oviedo
- Degrémont-Suez (Desaladora del Prat de Llobregat)
- ....

## References

- All inorganic methods in: K. Grasshoff, K. Kremling, M. Ehrhard (eds.) "Methods of Seawater Analysis", 1999, Wiley-VCH.
- R. Kérouel & A. Aminot, 1995, Mar. Chem. 57: 265-275.
- X.A. Alvarez-Salgado & A.E.J. Miller, 1998, Mar. Chem. 62: 325-333.

## Acknowledgements.

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