

Technical Report

On

Counterpart Technical Training in Japan

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By

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OUTLINE

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Introduction

- Carbondioxide (CO₂) gas was released from lakes Nyos and Monoun, in 1984 and 1986, respectively and killed a total of about 1737 people.
- The carbondioxide gas is magmatic in origin
- The gas is conveyed and accumulated in the bottom of the lakes by circulating groundwater (springs).
- To mitigate such natural disaster in the future a cutting edge scientific research is imperative to elucidate the nature of the disaster and to secure the lakes.
- Thus a collaborative scientific research SATREPS-IRGM project titled ‘ Magmatic Fluid Supply into Lakes Nyos and Monoun , and Mitigation of Natural Disasters through Capacity Building’, was instituted between Japan (JICA) and Cameroon (IRGM) in 2010.
- One of the main objectives of the project is capacity building (Human and Infrastructural (laboratory)).
- IC= Ion Chromatograph already donated to IRGM by JICA is used to analyse for : F, Cl, NO₂, Br, NO₃, PO₄, SO₄, Na, NH₄, K, Mg, Ca
- PICARRO, also donated is used to analyse for : Deuterium and oxygen-18 in water
- Milli-Q, also donated is intended to produce ultra pure water
- AAS (still to be donated) shall be used for trace elements analyses

To partly attain the overall objective of the project ‘ WE visited Japan TO IMPROVE UPON OUR CAPACITY TO PRODUCE RELIABLE DATA WITH THE JICA –DONATED EQUIPMENT (IC, PICARRO, and Milli-Q) AT NKOLBISSON-CAMEROON’.

Participants



Left to Right: Nlozoa Justin, Djomo Serges, Libongo Jean Christel, Fantong Wilson (team leader), and Tawedi Robert.

Methods and Laboratories visited in Japan

- Lectures from trainers
- Visiting laboratory setups, environment, and discussions

Location	Trainer	Power point lecture topic
Toyama University	Prof. Kusakabe	Basic principles of IC and LGR (DODA)
ACAP, Niigata	Dr. Tsuyoshi Ohizumi	Preparation of standards for IC & data check
RIHN, Kyoto	Dr. Nakano	Storing of water samples & exposure To cutting edge analytical equipment
Tokai University	Prof. T. Ohba	-PhD students presentations -Introduction to AAS -Titration of MK sampler samples from Lakes Nyos Monoun
SANYO Techno Co., Ltd. Tok	Dr. Kubota	Operation & maintenance of PICARRO
DIOTEC Tokyo Co.,Ltd.	Dr. Keishi Kawakami	Operation and trouble shooting for IC

NAITOH Env. Sci. Co., Ltd.	Kazuhiro Sekiguchi	Laboratory management to produce quality data
Millipore Merck Ltd, Tokyo	Dr. Yutaka Kushino	Practical installation, operation, trouble identification shooting of Millipore



ACAP Niigata



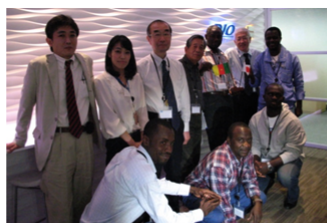
RIHN Kyoto



Tokai University



SANYO, Tokyo



DIOTEC, Tokyo



NAITOH Env. Sci.

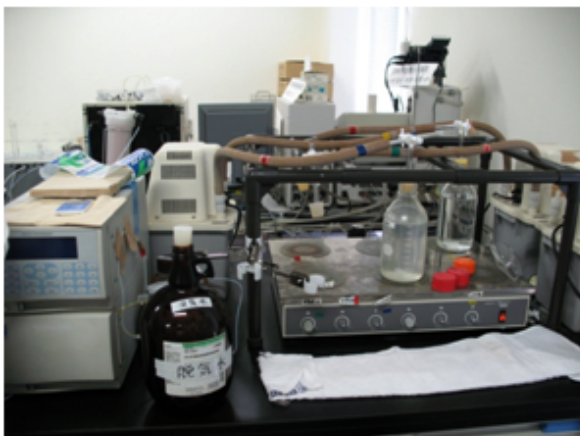
Take home lessons

1) For Ion Chromatography

Major problems at Nkolbisson are untimely availability of N₂ gas for cation IC operation, difficulty of preparation of laboratory standards from composite mother standard, no eluent degassing unit, high background conductivity, improper cleaning of nitrate cellulose filters, inadequate protection of IC consumables and wastage of reusable consumables.

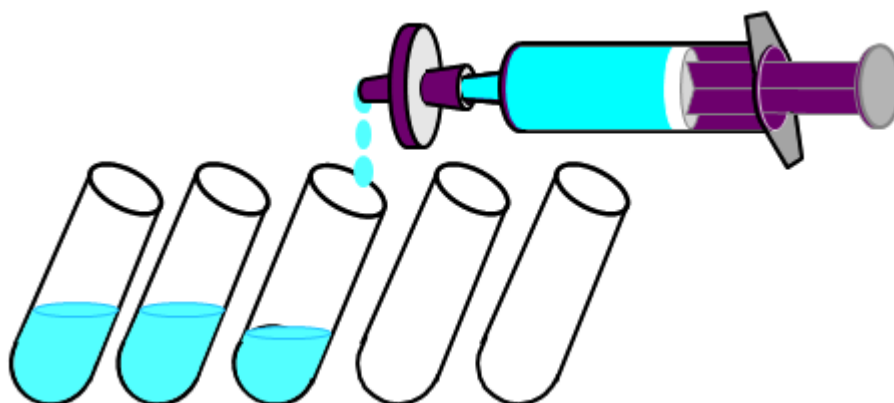
Solutions to those problems were,

- DIOTEC Tokyo Co., Ltd, offered a pump that will supply uncontaminated gas to replace N₂ gas. However, the Cameroon counterpart (IRGM) has to note that this gas pump needs a step up transformer, its life span is 1-2 years, and it cost 10,000 Japanese Yen (about 50,000 FCFA).
- DIOTEC Tokyo, explained an understanding method (proportionate dilution) of preparing laboratory standards from composite mother standard. Alternatively, IRGM buys mono-elemental mother standards.
- DIOTEC Tokyo also presented affordable units (see pictures) to degass eluent

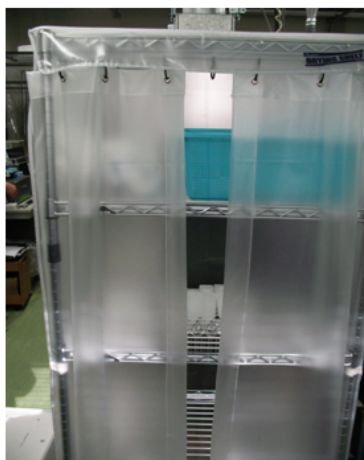


However, the costs of these eluent degassing units were not specified.

- H_2SO_4 should be used to reactivate the suppressor as a solution to high conductivity background.
- For adequate cleansing of filters, flow high purified water (HPW) through each filter and take fraction of the water per every 1ml, then determine the ions contained in the 1st, 3rd, and 5th fraction as shown below.



- To minimize contamination from filters, the Nkolbisson laboratory should change from using cellulose nitrate filters to hydrophilic PTFE filters.
- To keep laboratory equipment free from dust and clean Nkolbisson laboratory should be equipped with affordable cupboards as shown below.



-To minimize wastage of used consumables, plastic chips are washed either in ultrasonic agitating bath or in a detergent bath as shown below, and membrane filters are washed with pure water and rinsed with next sample.



2) For PICARRO

Major problems at Nkolbisson are: The green light on the switch key is not shining, and there is no spare filter for replacement; cleaning of vaporizer was not successful and lack of basic know how on vaporizer and analyzer pump; could not assign sample names during operation; no glass bottles for storing laboratory & sub standards; and no working standards yet prepared.

Solutions to those problems were,

- SANYO Tokyo Co., Ltd. offered a new switch unit, and a new filter to IRGM. We also learnt how to replace them.

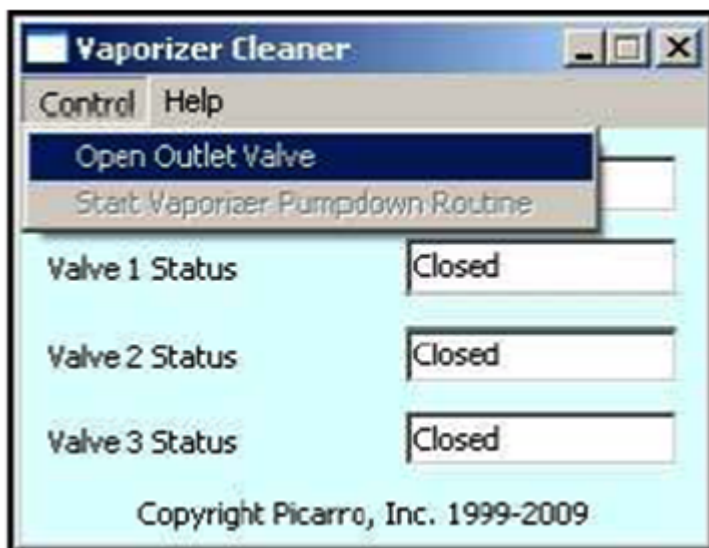


A new switch unit



A new filter

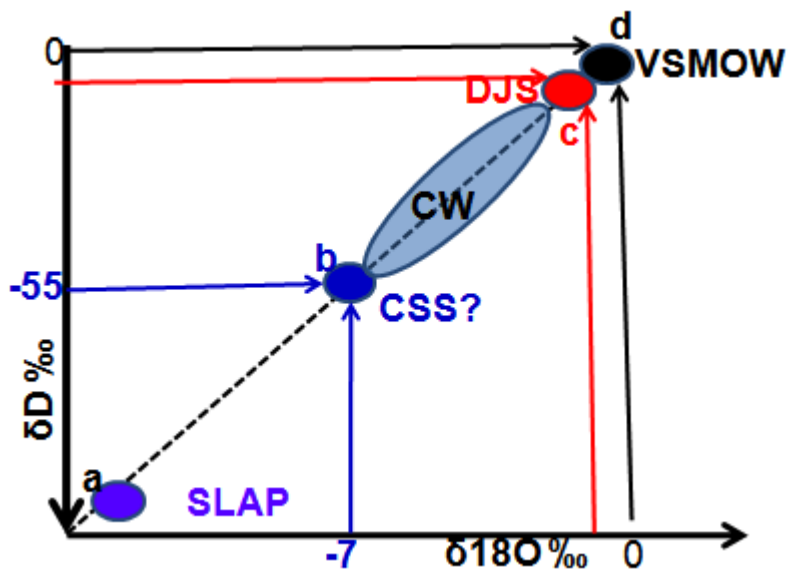
- To successfully cleanup the vaporizer we had to select the 'Open Outlet Valve' option, which we skipped during the operation.



- Vaporizer and analyzer pumps have to be replaced after 10000 hours of pumping. However, the costs of these pumps are not yet known.
- For inability to assign sample names to samples during analyses 'Is a general shortcoming of the PICARRO software. The PICARRO Company is presently working to make the assigning of sample names option more users friendly'.
- NAITOH Env.Sci. Co., Ltd. offered 40 glass bottles of 1 liter each for storing of sub standards.



- As for unavailability of sub-standards, Dr. Fantong Wilson bought desalinated seawater in Japan (DJS), whose isotopic signature should be closed to VSMOW). Mineral water (supermont? Another sub-standard water sample), shall be purchased in Cameroon by IRGM.
- On how the sub-standard water shall be calibrated with respected to available International standards?



Calibration line should be *linear and shortened* from a-d to b-c, thus better control of results obtained.

- Due to hardware depreciation, IRGM must be ready to replace the following backups for replacement subsequently: The CPU board, The hard disc (250 GB), The power supply board, and autosampler.

3) *For AAS*

Within the framework of SATREPS-IRGM project, JICA plans to donate this equipment to IRGM in the possible near future.

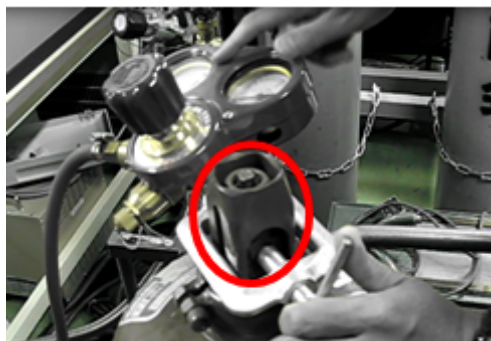
BUT IRGM-Cameroon has to ensure the availability of the following:

- Gas exhausting unit:



Intake = 55 cm above the AAS, intake length = 50 cm, Height = 25 cm, Width = 20 cm.

- Compatible connection end of oxygen gas tank



c) Availability of N_2O gas

4) *Laboratory management*

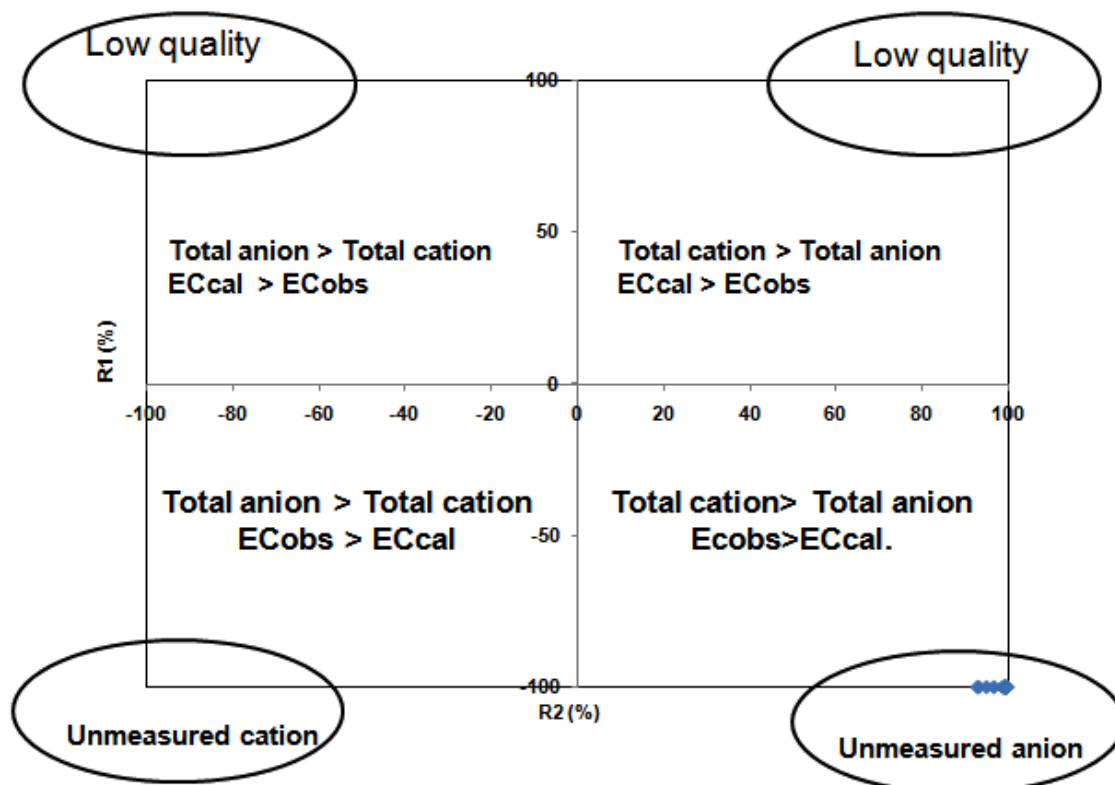
In addition to a clean laboratory environment, the NAITOH Environ. Science. Co. Ltd Laboratory is a reference laboratory because of its organization, which can be described by the “economic concepts” of division of labour with clearly defined units as follows; A Manager, sample receiving unit, sample coding unit, sample analyses units (IC, GC, ICP MS, Radioactive analyses, etc.) with each analytical unit having its own sample collection protocol, and preparation unit, results production unit, sample decoding unit, results quality control and interpretation unit, financial unit, and results distribution unit. An efficient and admirable example indeed!

5) *Milli-Q*

The solutions to the problems identified with the Milli-Q at Nkolbisson are;
Add another transparent filter between existing filter and the pro-guard, replace the pro-guard, installed a UV unit, disconnect the pipes and reconnect them and probably add a pressure guage before the pro-guard.

6) *Checking reliability and accuracy of data*

At Nkolbisson, only the ion balance approach (R1) is employed, but our exposure to the Laboratory of Asian Center of Atmospheric Pollution (ACAP), emphasizes the addition of another approach known as the conductivity agreement (R2). A composite use of R1 and R2 shall enable a better check of data produced as follows.



Courtesy visits

The participants paid courtesy visits to the Cameroon Embassy in Tokyo, The JICA head office, and the JST office.



Cameroon Embassy



JICA head office



JST head office

Striking culture



DARUMA

DARUMA = (Resolution)
Resolution = Determination

And in English an adage says

'Determination is the key to success'

To succeed

- punctual
- hardworking
- humble
- devoted
- Sacrifice
- Eager for results
- Supportive collaboration
- Future generation is a driving force

(JAPAN CHARACTERISTICS)

Conclusion

The training greatly improved our knowledge on operation, basic maintenance, acquisition of reliable data, and management of JICA donated equipment in the Nkolbisson laboratory in IRGM-Yaounde-Cameroon for water analyses.

Acknowledgements

