**IAEA-127**

# BRAZILIAN ION CHROMATOGRAPHY PROFICIENCY TEST – A FIVE YEAR EVALUATION

**L. R. Monteiro[1], D. Graffitti[2], F. Albano[3], M. Rodrigues[3], M. E. B. Cotrim[1], M. A. F. Pires[1]**

[1] Instituto de Pesquisas Energeticas e Nucleares /Comissao Nacional de Energia Nuclear, , Av. Lineu Prestes, 2242, São Paulo- Brazil

[2] CORSAN- Companhia Rio Grandense de Saneamento Porto Alegre- Rio Grande do Sul, Brazil

[3] Rede Metrológica do Rio Grande do Sul, Porto Alegre- Rio Grande do Sul, Brazil

*E-mail address of main author: lrmonteiro@ipen.br*

This paper will discuss the results obtained in the analysis of the 6 most common anions in water, during the last five years of the Ion Chromatography Proficiency Testing (PT) Program. PT´s were provided by Rede Metrologica do Rio Grande do Sul- RMRS that is one of the most active metrological groups in Latin America. Since 2007 RMRS has launched a yearly PT, sponsored by two main Ion Chromatography (IC) manufacturer companies, acting in Brazil. The participant´s performance is done by the most usual approach, by using Z-score and the program follows the procedures listed at ISO/IEC 17043 [1], at ILAC-G13:08 [2], and ISO/DIS13528 [3].

The technical support to prepare, store and to perform the stability and homogeneity tests came from the water supply company of the Rio Grande do Sul, CORSAN. The IC aspects observed in the PT were more recently evaluated by Ipen-CNEN/SP, one of the first laboratories to use this technique in Brazil, with almost 30 years of experience on IC.

In 2007, the PT was originated by a user´s group demand, in Brazil´s south area. Among the initial 26 laboratories, only 5 had less than one year experience on IC technique. Eleven laboratories had more than 5 years' experience. In 2008, 15 from the original group remained in the program that had a total of 26 laboratories. In 2009, 10 beginner laboratories participated again, and 7 were first year participants, given a total of 21 labs. In 2010, from the total of 29 laboratories, 9 were present in all previous PT, and 13 were first time participants. In 2011 PT edition[4], from the total of 38 laboratories, located in 11 Brazilian States, only 4 were present in all previous editions, and 9 were laboratories that had the first IC instrument installed in the last year.

During those years, the PT single requirement was to use IC as analytical technique. No main operational conditions (i.e. column, eluent, suppressor type, loop, or detector) in the IC system were requested to be used or even informed from any participant laboratory.

It is possible to compare the coefficient of variation (CV) for each anion for every year in Figure 1. The CV´s obtained in Brazilian PT were similar to other collaborative studies in Europe [5] for Nitrate-N (3.63 to 14.95%, excluding 2007 1$^{st}$ round value) and Sulfate (4.52 to 13.94%). Nitrate-N, Nitrite-N and Phosphate-P 1$^{st}$ round results were disregard because many laboratories expressed the correspondent concentrations as Nitrate-NO3, Nitrite-NO2 and Phosphate-PO4, instead of its elemental form. Locally Chloride CV´s (3.33 to 12.11%) were lower, even when rounds with the same concentration samples are compared with the European results [5]. Also chloride was the anion with the lowest CV, and in the five year evaluation, the anion on which laboratories had the best performance.

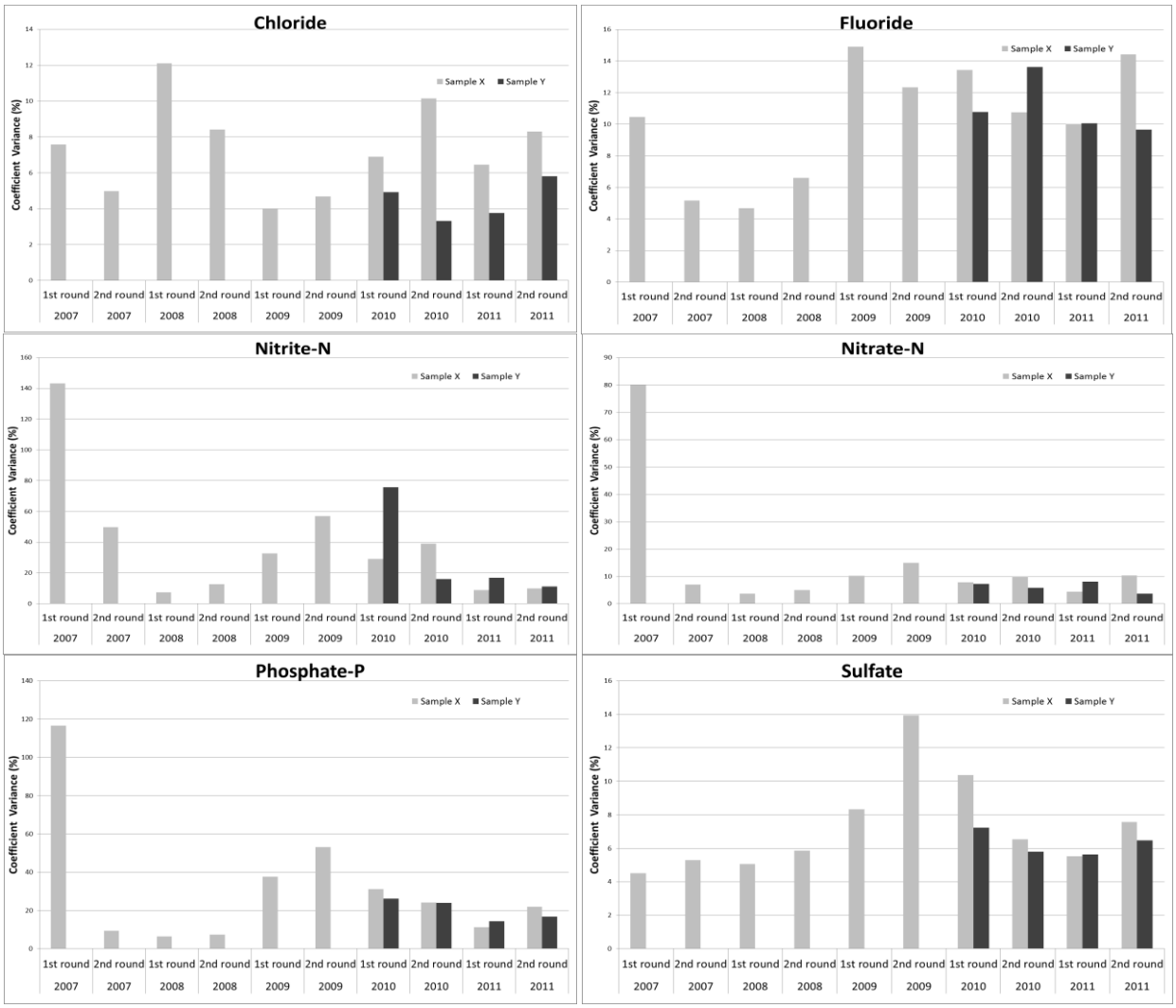


*FIG. 1*. Individual anion coefficient of variation (in %), observed from 2007 to 2011.

It is also clear to all the personal responsible by these PT in Brazil, that as long as those exercises are an excellent tool for "educational purposes" on IC and to spread the "metrological culture" inside environmental laboratories, no advance was done to reach the so called "true value". It is also noticed that many laboratories have no clear traceable chain or uncertainty evaluation.

Currently RMRS performs local actions to train associated laboratories to calculate the measurement uncertainty on several essays. In the future, this group intend to implement local actions to establish an affordable and accessible traceable chain.

## References


[1] ISO/IEC 17043. Conformity assessment - General requirements for proficiency testing, ISO, Geneva (2010)

[2] ILAC G13:08 – Guidelines for the Requirements for the Competence of Providers of Proficiency Testing Schemes, (2007) http://www.ilac.org/documents/ILAC_G13_08_2007.pdf

[3] ISO 13528. Statistical methods for use in proficiency testing by interlaboratory comparisons, ISO, Geneva (2005).

[4] Rede Metrológica do Rio Grande do Sul, "Relatórios dos Programas de Proficiência em Cromatografia Iônica – Ânions" (2011) http://www.redemetrologica.com.br/2010/interlaboratoriais.php?id=64

[5] R. Mosello et al., "Ion chromatography performances evaluated from the third AQUACON freshwater analysis interlaboratory exercise", Accred. Qual. Assurance, **9** (2004) 242–246.