Certified reference materials for PAC studies issued by the JRC-IRMM

Franz Ulberth[1], Berit Sejeroe-Olsen[1], Ofelia Bercaru[1], Hendrik Emons[1]

[1]EC-JRC-IRMM

Thousands of chemical measurements are carried out per day around the globe in order to provide the groundwork for decision making. Practically every aspect of life is concerned by such decisions: the safety and quality of the food we eat, the sustainability of the environment we live in, etc. Because of the wide-ranging consequences of such decisions, analytical data have to be comparable and reliable. Translated into more technical terms, measurements have to be traceable to a stated reference system (preferable the SI), and they have to include an uncertainty statement. Mutual recognition of measurement data is extremely important to avoid duplication of analyses, thereby reducing costs and resources associated with testing. A diverse array of instruments such as laboratory accreditation, participation in proficiency testing schemes, analytical quality assurance tools, etc, has been set up in order to build trust in the competence and the measurement capabilities of testing laboratories. Certified reference materials (CRMs) are one of the key-elements for ensuring analytical data quality. In principle CRMs may be in the form of pure crystalline substances / pure substances in solution, or in the form of a real-life matrix material. The former are used for calibration while the latter are normally used to assess the trueness and precision of a measurement method and to establish metrological traceability of the measurement results.

The Institute for Reference Materials and Measurements, which is part of the Joint Research Centre of the European Commission, started already in the 1980s a far reaching programme to supply the scientific community with a broad range of high-purity PAH, PCDD/PCDF and PCB congeners, all of them having certified purities. Currently, more than 60 crystalline PAH and PCB congeners, including nitro- and oxygenated species, are on offer (catalogue at: www.irmm.jrc.be). The crystalline substance programme is complemented by a series of nine ready-made solutions containing native and 13C labelled PCDD/PCDFs (BCR-614 solutions S0 to S8) intended for the analysis of dioxins by isotope dilution mass spectrometry. For the validation of analytical techniques a broad range of matrix materials certified for PACs have been issued by the IRMM; matrices covered include different types of soil, sewage sludge, sediment, biota and food. Currently, work is underway exploring the feasibility of extending the programme to cover also aqueous matrices in response to monitoring requirements set forth by the EU Water Framework Directive. Further activities in the PAC reference materials programme have been triggered by recent EU legislation (Commission Directive 2005/10/EC and Commission Regulation (EC) 208/2005) regarding maximum levels for PAHs in foodstuffs.

In general, the demand for certified reference materials is on the increase due to the fact that a proliferating number of legal acts introduce various limits and statutory values, which have to be met in an attempt to protect consumers and the environment, to guarantee fair competition, etc. In order to keep pace with this development reference materials producers have to develop smart strategies for producing materials that are fit-for-purpose and match the natural state of the matrix as appropriately as possible. Besides those technicalities time-to-market and cost effectiveness are other important issues. Networking and co-ordination of work programmes among producers is therefore an absolute necessity to supply the measurement community, which is confronted with every increasing requirements for high analytical data quality, with suitable QA / QC tools.