



PCB's in ARGENTINA

Gotelli M., Lo Balbo A., López A., Signorini, L. and Gotelli C. A.



Centro de Investigaciones Toxicológicas S.A.
 Juan Bautista Alberdi 2986 - C1406GSS Ciudad de Buenos Aires - ARGENTINA

Emergencias (24 Hs) +54 11 4613 - 1100 consultas@ciquime.org.ar www.ciquime.org.ar

INTRODUCTION

When the pollutants of concern are reported in the press to be suspected of causing cancer or other politically-charged health problems (such as learning disabilities, sexual dysfunction or disproportionate impacts on minorities) all test data may receive close attention from both regulators and environmental activist groups. The PCB detection from or near a facility may produce both regulatory actions and frightening headlines about health or ecological harm that may not exist.

In 1996 EDENOR (a company that performs electricity distribution services in the northern region of Buenos Aires. The concession area comprises a territory of approximately 4,637 km² with a total population in excess of 7 million and over 2 million customers) decide to analyze and treat all remaining transformers that contain polychlorinated biphenyls (PCB's) at levels above the regulatory limits. In conjunction with this, an overall evaluation of environmental aspects such as air quality, water, soil, sediment, sludge, "wipe tests" and biological materials is carried out.

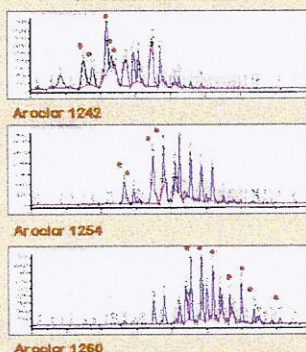
As a consequence, the laboratory applications had to be improved for solvent substitution, miniaturization of extraction and cleanups, minimization of reagent consumption, reduction of cost per analysis, and reduction of time. These new procedures provided adequate data that meet all the performance and regulatory requirements for the determination of PCB's.

ANALYTICAL VALIDATION

Chromatographic Conditions

TECHNIQUE: Gas Chromatography – ECD
 EQUIPMENT: HP5890, HP7673A
 SAMPLE: Insulating oil
 INJECTION VOLUME: 1 µL (Split 1.00:1)
 TEMPERATURE -Injection: 250°C
 -Detection: 320°C
 -Ramp: 140°C to 290°C
 CARRIER GAS: N₂, 2mL/min
 COLUMN: SPB-5 (15m, 0.32mm, 0.25 µm)
 RANGE: 0.2 to 4 µg per sample
 TIME PER SAMPLE: 13 min
 CLEAN UP: florisil column
 STANDARD: PCB in transformer oil
 CALIBRATION: relevant peaks areas

Calibration

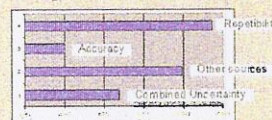


Uncertainty Estimation

Identify Uncertainty Sources



Histogram Uncertainties



$$U = \pm X \cdot 0.05 \mu\text{g/g}$$

Method Detection Limit

$$MDL_{0.95} = t_{(n-1, 0.95)} \times S$$

$t_{(n-1, 0.95)}$ = student's t value for n-1 and a confidence level of 95% = 3.143
 n = number of replicates (n=7)

$$MDL = 0.2 \mu\text{g/g}$$

Quality Assurance

Intercomparison Testing

Instituto Nacional de Tecnología Industrial
 Participation since November, 2000
 Score: all results IVZ < 2 (Satisfactory)

EXPERIENCE

NUMBER OF SAMPLES HANDLED IN THE LAST 5 YEARS

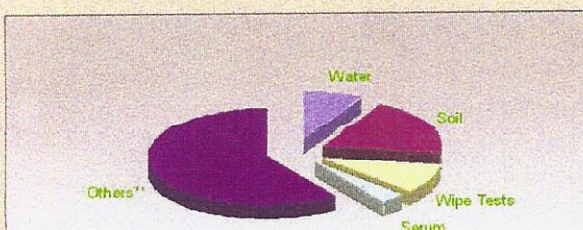
SAMPLE	YEAR					TOTAL
	2000	2001	2002	2003	2004	
Oils*	3605	9756	1274	1234	1389	17258
Water	33	3	1	11	6	54
Soil	40	33	23	17	16	129
Wipe Tests	3	0	0	5	62	62
Serum	0	0	0	1	22	23
Others**	3	1	10	75	308	397

* Insulation liquids, dielectrics, used oils, different oil matrices

** Air, wood, vegetal materials, cement, different waste matrices, building sealants

DISTRIBUTION OF MATRICES

(excluding oils, which represents 96% from total)



ISO / IEC 17025

In 2003 CIT SA has received ISOIEC 17025 accreditation from the Organismo Argentino de Acreditación (OAA) for ASTM D4059-00.

Periodic audits by OAA assigned experts assure the maintenance of quality systems and that mandatory continuous improvement goals are met.

CONCLUSIONS

- ✗ The analytical method was fully validated, having well-defined traceability and uncertainty
- ✗ Time-sustained inter-lab proficiency tests provide an ongoing critical assessment of analytical measurement consistency.
- ✗ The quality system implemented by CIT SA as well as its ability to carry out the selected analysis were accredited by OAA
- ✗ The scientific aspect was reviewed and accepted for