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CLEAN WORKING PLACE

DEVELOPED BY ANALIT LTD FOR TRACE SPECTRAL ANALYSIS

Most of the errors occurring during the trace elements determination are caused by the contamination of the solutions at the stages of samples or calibration solutions preparation. One of the main sources of contaminations is the laboratory atmosphere that contains the admixtures of the determined elements in dust and aerosol forms. Other contaminations may come from the laboratory vessels being used, water and reagents, dosing units and the analyst himself. Background concentrations of elements in a common laboratory can be quite high and may cause serious random and systematic errors, especially during the determination of

widespread elements such as Al, Si, Ca, Mg, Na, Fe, Zn, Cu, P, etc.

It is usually recommended to perform the analysis in dust-free "clean rooms" to avoid these errors. Such rooms have the inflow ventilation systems with multi-stage air filtration, walls, floor and ceiling made of special non-dusting materials and the air-lock entrance. However, it is not always reasonable to create these dust-free "clean rooms": it is quite expensive, difficult and not very comfortable for the staff. There is much easier solution.

OUR SOLUTION —

CLEAN WORKING PLACE (CWP)



Contamination become significantly less possible with the mobile Clean Working Place (CWP) offered by ANALIT Ltd. for the preparation and storage of samples, calibration solutions and laboratory vessels used for determination of trace concentrations performed with atomic-absorption analysis (AAA), atomic-emission spectrometry with inductively coupled plasma (ICP-OES) and mass spectrometry with inductively coupled plasma (ICP-MS).

CWP is the molded plastic box (inner volume is approximately 0,7 m³) that has no metal parts inside and therefore is immune to any corrosion. CWP has an integrated inflow ventilation and air filtration system and can be operated in two modes.

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SAMPLE PREPARATION MODE:

The air purified of dust and aerosols is blown into the chamber to create overpressure. In a few minutes the inner space of CWP becomes a clean dust-free zone: common air is replaced with a filtered one, dust and aerosol particles are forced out of the chamber and no new metal-containing particles appear because the chamber is fully made of non-dusting materials. As a result neither samples, nor calibration solutions and laboratory vessels are contaminated during the preliminary stages of the analysis. The Sample Preparation Mode is also perfect for cleaning of the laboratory vessels (i.e. steam cleaning). It is also reasonable to use this mode for the production, storage and usage of clean water, etc.

After blowing-in of the filtered air is stopped, the inner space of CWP remains a dust-free zone for a long time that makes it ideal for the storage of samples, calibration solutions, laboratory vessels, reagents, water, etc.



DISTILLATION MODE:

In this mode the device operates as a fume cupboard without any corroding parts that suits perfectly to produce extra-clean acids and other reagents by distillation or other methods. The air incoming to the CWP during the distillation also passes through the filtration system and does not contaminate the distillation products.

CWP is different from the seemingly similar devices (laminar boxes, fume cupboards, etc.) because it possesses a number of features and benefits:

- **Multi-functionality.** Due to its design and construction materials CWP can be used for sample preparation, making and storage of calibration solutions, distillation of aggressive agents, production of clean water, cleaning of laboratory vessels, dispensers, sample injection units, etc.
- **Autonomy.** CWP does not require connection to the laboratory ventilation system in the sample preparation mode. It can be easily placed under the fume hoods while working with aggressive agents.
- **Mobility.** Due to its small weight, compact size and full autonomy the CWP is a mobile system that can be installed anywhere in a laboratory and moved easily if necessary. For example, CWP can be located right beside a spectral instrument that is comfortable for work and decreases the possibility of contamination of the analyzed solutions during their transportation from the sample preparation zone to the instrument.
- **Absolute corrosion resistance.** The whole working chamber of the CWP is made of non-metallic materials and therefore does not corrode and contaminate the samples.



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SPECIFICATION

AIR FILTRATION AND BLOWING-IN SYSTEM:

- Removable device that creates air overpressure inside the working chamber.
- The air is blown into the chamber after two-step filtration. The filters are located in a special cartridge and can be easily replaced. Preliminary purification filter has to be replaced once in a few months. The lifetime of the fine purification filter depends on the usage conditions, but usually doesn't last less than 2-3 years. The system removes 100% of particles larger than 0,3 μm and 85% of the particles smaller than 0,3 μm *.

EXHAUST VENTILATION SYSTEM:

- CWP is equipped with pipe neck for connection to the laboratory ventilation system. The neck is immune to corrosion. It allows to use CWP as a fume cupboard for the distillation of acids and other corrosive agents.

CWP WORKING CHAMBER:

- Contains no metal parts, does not corrode and contaminate the samples. All the inner corners are rounded that minimizes the risk of dust accumulation.

- Moving protective screen has no frame or any other metal parts. It is made of transparent acrylic glass resistant to cleaning liquids. It can be removed and installed easily.
- Operations inside the CWP are performed via the glove flanges located on the front side of the device. The flanges are equipped with a special glove system: sleeves + replaceable gloves. It is also possible to operate without gloves and/or sleeves.
- CWP is illuminated by integrated lamps, protected with plastic windows.

INTEGRATED MONITORING SYSTEMS:

- Electromechanical airflow control system.
- Electronic filter contamination indicating system.
- Electronic overpressure indicating system.

AVAILABLE OPTIONS:

- Workbench made of fiberglass or epoxy resin compound.
- Mobile support frame with wheels or plastic support frame without wheels
- HEPA-filters for different levels of air purification.



* More deep purification of the air is possible with an optional fine purification filter.

CWP allows to create the localized clean working place easily inside the clean room as well as in common laboratories. In the clean environment the CWP prevents contaminations caused by the analyst and by the equipment that he uses. In common laboratories the CWP helps to protect the sample preparation process from any external contaminations and can be located right near the analytical instruments. In all cases CWP can be used both for work and safe storage of samples, reagents and calibration solutions.

CONCENTRATION OF VARIOUS ELEMENTS IN THE AIR OF SAINT-PETERSBURG AND THEIR INFLOW INTO THE LAB

Element	Concentration		Lab inflow		
	In the air, ug/m ³	In the Earth crust, %*	In 1 hour, mg	In 1 day, mg	In 1 day for 1 cm ² , ng
Si	5,9	27,0	17,0	119	170
Al	1,8	8,1	5,2	36	48
Fe	1,5	4,6	4,3	30	40
Ca	3,3	3,0	9,4	66	89
K	0,4	2,6	1,2	8,4	11
Mg	2,9	1,9	8,4	59	76
Na	0,4	2,5	1,0	7,0	90
Mn	0,3	0,1	0,7	4,9	7,0
Zn	0,3	0,02	0,9	6,0	8,5
Cu	0,1	0,005	0,3	2,1	3,0
Pb	0,02	0,0002	0,04	0,3	0,4
Ni	0,003	0,006	0,008	0,06	0,09
Cr	0,002	0,008	0,006	0,04	0,06

The table contains the concentration values of various elements in Saint-Petersburg air. The assessment was performed for the 70 m² lab with the air inflow of 2885 m³/h.

* I.L. Grinshtein, "The optimization of conditions for the atomic-absorption analysis with graphite electrothermal atomizers" /"Industrial laboratory", 1997, №4, p.14-25



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