

AOX Sample Preparation

Sample Preparation for Liquid AOX Samples
by Column Method

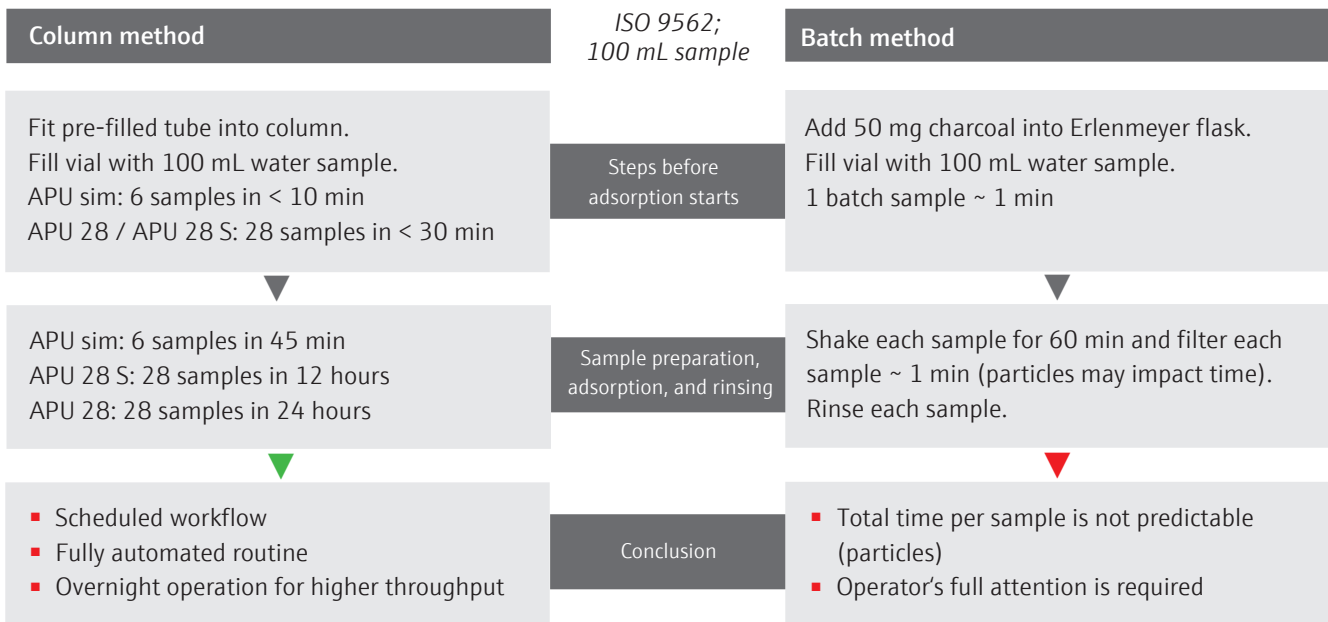
AOX Sample Preparation



Find Your Way for AOX Sample Preparation

Column sample preparation for fast, easy, and automated analysis.

AOX analysis for wastewater, surface water, and river water is regulated by many international standards. Sample preparation is usually done either by batch method or column method. But which is the best way for sample preparation?



While batch method is often the method of choice, it is very tedious, requires the full attention of an operator, and the total time per sample is not predictable, especially when particle-containing samples need to be analyzed.

The Analytik Jena solution for column method in turn, can easily deal with particles, offers different degrees of automation, and reduces handling steps and likely errors. This makes AOX results more comparable and saves time in your lab work, as well as costs for analysis.



Figure 1: APU sim

Your benefits using the column method

- Defined time per sample
- Automated workflow
- Most cost-efficient routine
- Comparable results

Challenges in AOX analysis of aqueous samples

Water samples that are analyzed according to ISO 9562, for example, can contain particles and/or a high level of salts. Inorganic salts in water samples greatly interfere with adsorption on the surface of activated carbon. Particles lead to the fact that filtration steps in the batch method cannot be terminated. Besides, hoses and/or columns of conventional column systems can become clogged. Analytik Jena offers solutions for both problems.

Particle-containing samples

The column method utilizes at least two pre-filled quartz tubes with 2 x 50 mg of active carbon that can be tested individually and give an indication about completion of adsorption (breakthrough). Hence, operators gain assurance of correct AOX results.

In addition to the duplex column, Analytik Jena offers a triplex solution that improves handling of particle-rich samples. The third tube is also made from quartz, containing quartz wool and is installed in line with the duplex column (pre-filter).

Particles are trapped by the quartz wool, and the AOX from aqueous samples can readily adsorb to the active carbon, avoiding clogging of tubes.

Finally, active carbon tubes loaded with AOX are ready for analysis and the pre-filter can also be submitted to the AOX analysis. By doing that, operators can further distinguish between particle-bound AOX and dissolved AOX.

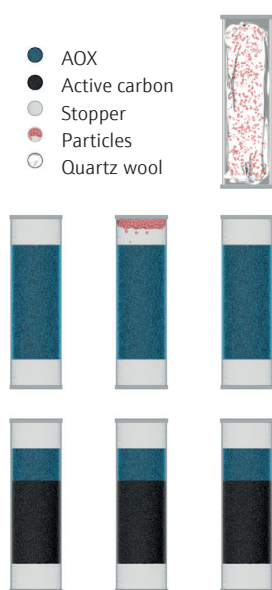


Figure 2: left: duplex column with particle-free AOX sample, middle: duplex column with particles clogging first tube, right: duplex column with pre-filter (triplex) separating high particle load from AOX sample

Salt-containing samples

For samples with high inorganic salt load, the AOX content of an aqueous sample is often found to be more evenly distributed among both tubes of the duplex columns. As inorganic chloride competes for adsorption sites on the active carbon of the first tube, the resulting AOX value is not reliable. Hence, the inorganic chloride ought to be separated from aqueous samples prior to the AOX adsorption, and for that operators make use of the SPE-AOX approach.

The SPE-AOX approach comprises the following steps:

- 1) Conditioning of SPE cartridge with methanol
- 2) Addition of sample containing inorganic salt and AOX, the latter adhering to polymer
- 3) Rinsing with H₂O or suitable washing solution containing nitrate to remove inorganic salt
- 4) Elution of AOX from polymer into transfer flask

Subsequently, the obtained sample is submitted to AOX adsorption onto the active carbon in the duplex column.

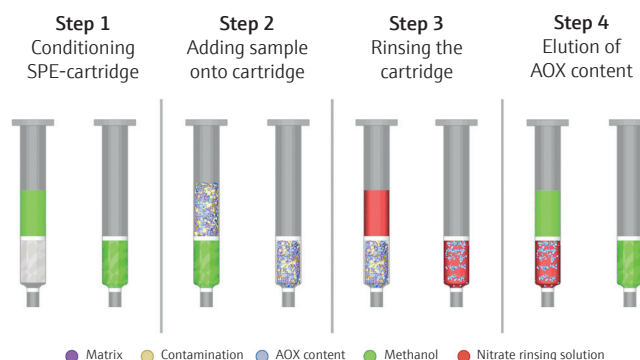


Figure 3: SPE – preparation steps prior adsorption onto active carbon

Disadvantages of batch method

- 1 x 50 mg only
- No information on completion of adsorption (breakthrough)
- Uncertainty of correctness of results
- No means to separate particles
- No species information (bound versus dissolved)
- No automation of workflows

Disadvantages of batch method

- Extra accessory for SPE sample preparation is required in addition
- No automation of workflow
- Uncertainty of correctness of results
- Risk of exposure to volatile methanol

Product Overview

The APU series, utilizing the column method according to international regulations, e.g., ISO 9562, EPA 1650, and ISO 11480, enables laboratories to obtain fast, precise, and correct results with a high degree of automation. Due to its flexibility all devices of the APU series support AOX analysis in combination with AOX analyzers of all common brands. Analytik Jena's sample preparation units and active carbon adsorption are also well prepared for emerging AOF (adsorbable organically bound fluorine) applications.

APU 28 – the basic one

- Processing of the individual samples takes place in immediate succession

APU 28 S – the fast one

- Optimal solution for high-throughput applications
- Simultaneous preparation of 2 samples

APU 28 SPE – the versatile one

- Ideal for samples with high saline content
- AOX and SPE-AOX sample preparation with one device

APU 28 flexi – the new flexibility

- All APU 28 devices can be used with other manufacturers' adsorption columns
- A flexible tray and optimized column holders enable processing of column sizes of 40 x 9 mm and 47 x 6 mm

APU sim – the small one

- Simultaneous enrichment of up to 6 samples
- Channels can be operated individually
- Excellent particle handling
- Suitable for columns of all brands
- SPE-AOX sample preparation possible



Figure 4: APU 28



Figure 5: multi X 2500 AOX analyzer

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Subjects to changes in design and scope of delivery as well as further technical development!

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