



# Dioxin Analysis Blank Control: 5 Root Causes and Proven Countermeasures

## How to Reduce Blank Contamination in Dioxin Analysis — A Practical QA/QC Guide

Updated: 2026-03-19 · Reviewed by: MIES content review team (MIURA CO., LTD.)

---

### Introduction

In dioxin analysis, even trace levels of contamination not originating from the sample can be detected as blank signals, distorting the true concentration. When the background level is elevated, subtle differences at low concentrations become difficult to see. Therefore, routine blank control is one of the most critical elements of QA/QC.

### Why Blank Control Matters in Dioxin Analysis

As a result, samples may appear to contain higher concentrations than they actually do, and data variability may increase, reducing overall analytical stability. These issues often lead to additional reanalysis and troubleshooting, causing delays and increasing operational costs. Because regulatory limits for dioxins are extremely stringent, even minor background contamination can affect the final assessment.

#### Typical impacts include:

- Increased LOQ/MDL and reduced reliability in the low concentration range
- Misinterpretation of results as high-concentration samples, requiring additional explanation
- Additional processing steps and extended turnaround time
- Root-cause investigations that consume senior analysts' time

## Five Common Sources of Blank Contamination in Dioxin Testing

In practice, sources of blank contamination can be broadly grouped into five common categories to facilitate efficient troubleshooting.

### (1) External contamination during pre-treatment and extraction

- Inadequate cleaning of glassware
- Carryover after handling high-concentration samples (e.g., glassware and evaporators)
- equipment



### (2) Column- or adsorbent-derived background

- Batch-to-batch variation in silica, alumina, or carbon materials
- Non-uniform activation conditions (temperature, time, solvent exchange)
- Degradation due to prolonged storage or moisture uptake

### (3) Solvents, reagents and consumables

- Trace dioxins or plasticizers in organic solvents
- Leachables from syringes, filters, or tubes
- Inadequate cleaning of tanks and lines

### (4) Work environment

- Insufficient hood airflow or turbulence causing backflow
- Residues on benches or pipettes due to inadequate cleaning
- Deposition of organic compounds or particulates when HVAC (heating, ventilation and air conditioning) systems are off

### (5) Human error in manual handling

- Incorrect timing or connections during column switching
- Errors in fraction collection or labeling
- Insufficient conditioning or rinsing time

## How to Eliminate Blank Contamination: Countermeasures by Root Cause

### (1) Glassware and vessels: rigorous cleaning and segregation

- Bake at high temperatures (e.g., 450–500°C) or perform extended Soxhlet extraction (cleaning)
- Separate tools used for high-concentration and routine samples, including during storage
- Seal cleaned items with aluminum foil to prevent airborne contamination

## **(2) Adsorbents/columns: lot management and standardized activation**

- Evaluate blanks for each incoming lot and maintain full traceability
- Standardize activation parameters (temperature, time, solvent) in the SOP and correct any deviations
- Re-evaluate long-stored items and establish clear discard criteria

## **(3) Solvents, reagents and consumables: routine QC**

- Run solvent blanks at each lot change
- Adopt low-leachable materials for syringes and filters, and standardize pre-rinsing procedures
- Schedule periodic flushing of tanks and lines

## **(4) Environment: facilities and housekeeping**

- Periodically verify hood airflow/velocity; replace filters and optimize airflow as needed
- Wipe surfaces with the specified solvent and cloth before and after work, and document completion
- Prohibit work during HVAC downtime and protect benches overnight

## **(5) Human factors: error proofing**

- Implement double-check procedures for critical steps such as material switching and fraction collection
- Prepare SOPs with clear photos and diagrams, and provide regular training
- Investigate incidents promptly and ensure that corrective and preventive actions (CAPA) are completed

## **MIURA's Proposal: GO-EHT for Blank Suppression**

Conventional measures cannot fully eliminate blanks arising from manual handling, adsorbent variability and environmental exposure. GO-EHT addresses these challenges by combining pre-packed, blank-tested columns with a fully automated, closed-system fractionation process, thereby minimizing both human error and environmental sources of contamination.

### **Design points directly linked to blank reduction:**

- Pre-packed columns: No activation or extensive rinsing required; minimal lot-to-lot variation
- Closed system: Protects the process from airborne and bench-derived contaminants
- Automated sequencing: Eliminates timing and fraction collection errors
- Approximately 90-minute cycle: Short processing time reduces column degradation and the risk of re-contamination



## Measurable Effects: How GO-EHT Reduces Blank Variability in Dioxin Analysis

- Stabilized blank levels: Reduced day-to-day and operator-to-operator variability, resulting in stable LOQs
- Reduced reanalysis rates: Eliminating common failure factors in advance shortens overall processing time
- Reduced labor and opportunity costs: No activation, rinsing, or conditioning steps required
- Simplified training: A consistent background level supports both junior and senior analysts

[Learn more about GO-EHT](#)

### Next Steps

If your laboratory is experiencing challenges with blank variability, reproducibility, or operator-dependent differences, automation can help improve stability. Discover how GO-EHT can help maintain steady background levels and integrate seamlessly into your existing QC workflow.

[CONTACT US](#)

#### MIURA CO., LTD.

Miura Institute of Environmental Science  
864-1 Hojotsuji, Matsuyama, Ehime 799-2430, JAPAN  
TEL: + 81-89-960-2350  
Email : [MIES@miuraz.co.jp](mailto:MIES@miuraz.co.jp)  
Website: [https://www.miuraz.co.jp/e\\_science/en/](https://www.miuraz.co.jp/e_science/en/)

The Best Partner of  
Energy, Water and Environment

**MIURA**