

Background

EPA has found that many Method 323 emission tests are not performed in accordance with the method. Inaccurate measurements may be obtained due to common test method deviations, irregularities, and errors.

This brochure summarizes best practices to minimize human error during preparation, sampling, and data analysis in performing Method 323. This guidance applies when using Method 323 to measure emissions from both engines with post-combustion controls (e.g., oxidation catalysts) and engines with no controls.

For More Information

To download or print more copies of this brochure:

www.epa.gov/nscep

To access a Technical Report that provides additional information on the recommendations in this brochure:

Visit www.regulations.gov and search for Document ID “EPA-HQ-OAR-2008-0708-0467”

To view the full text of EPA Method 323:

Visit www.epa.gov/ttn/emc/methods/method323.html

Still have questions on this method?

Contact the EPA expert Ray Merrill at merrill.raymond@epa.gov



How to Avoid Common Testing Errors when Using US EPA Method 323 – Best Practices for Best Results

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Preparation

1. Minimize the sample line length where possible, and ensure the sample line configuration directs flow downward toward the first impinger.

Condensation may accumulate in sections where the sample line configuration is parallel, sloped upward, or looped. Sample losses may result where condensate containing formaldehyde is allowed to accumulate, leading to inaccurate measurement.

2. Inspect and clean sampling lines before conducting test.

Pre-test inspection and cleaning will remove contaminants that may be present. Flushing the sampling lines with air will remove any moisture.

3. Make sure to configure the sample train with midjet impingers.

Method 323 Section 6.3 specifies three midjet impingers are required for sample collection. You should avoid using Greenburg-Smith impingers or larger impingers since the added volume of the impingers and associated recovery rinses would raise the detection limit of the method.

Sampling Procedures

4. Do not exceed the test method maximum sampling rate of 0.4 L/min.

It is critical that you do not sample at a flow rate higher than 0.4 L/min. Sampling at higher flow rates may reduce formaldehyde collection efficiency resulting in measured formaldehyde concentrations that are less than the actual concentrations.

5. Make sure to thoroughly rinse the probe and sampling line during sample recovery, even if more than 10 mL of water is required.

Method 323 Section 8.3 states: "In general, combined rinse volumes should not exceed 10 mL." However, in cases where a long, flexible extension line must be used to connect the sample probe to the sample box, sufficient water must be used to rinse the connecting line to recover any sample that may have collected. The volume of the rinses during sample recovery should not be excessive, as this may result in your having to use a larger-than-40 mL VOA bottle.

6. Be aware that accurately measuring moisture with Method 323 may be challenging.

Make sure to thoroughly dry the outside of the impingers before weighing. Avoid allowing condensate to collect in the sampling line, as described in recommendation #1 in this brochure. Moisture that accumulates in the sampling line should be added to the first (knock out) impinger and included in the moisture determination. Since moisture may collect in a common sampling line feeding duplicate sampling trains, the duplicate trains must be independent, including independent sample probes and lines.

QA/QC and Data Analysis

7. Ensure that you review and follow the Quality Control requirements for Method 323.

Method 323 Section 9 lists QA/QC requirement categories, acceptance criteria, and corrective actions.

8. When calculating mass emissions of formaldehyde using Method 323 Equation 323-5, ensure that K_c , the spectrophotometer calibration factor, has been correctly developed.

Method 323 Section 12.1 defines K_c as: "spectrophotometer calibration factor, slope of the least squares regression line, $\mu\text{g}/\text{absorbance}$." It should be noted that the value of micrograms, μg , used in developing the regression line to calculate K_c , should be per 2-mL aliquot. Equation 323-5 includes a division factor of 2 to account for this; if K_c is not developed on the basis of a 2-mL aliquot, formaldehyde mass emissions will be under-estimated by a factor of 2.

