

CL-071R

**Determination of Dry Weight
For Solids**

Revision: 2

Date Effective: September 2017

Dugway Proving Ground EPA ID Number: UT3750211259

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1.0 Scope and Application

This method provides procedures for the determination of moisture content in solid samples and subsequent correction of results, method detection limits (MDLs), and reporting limits for moisture in a solid matrix. It is based on the approach in United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.

This method is applicable to solid wastes, soils and other solid matrices that may require a dry weight determination and results conversion regulated by the compliance program at US Army Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody are found in the DPG Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan (QAPP)*.

2.0 Scientific Basis

Samples are collected by the appropriate sampling technique. At the time of sample preparation, a representative aliquot is weighed and dried in a drying oven overnight. The dried sample is then weighed and the moisture content of the sample is then calculated. Sample results, MDLs, and reporting limits are then corrected for the moisture content of the sample and reported on a dry weight basis. This technique is used for solid type samples that go through a solid/liquid extraction and may require a moisture correction. The determinative method is not relevant for this technique.

Interferences are generally not applicable to this procedure.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- DPG – US Army Dugway Proving Ground
- LCS – Laboratory Control Sample
- Method Blank – A negative control prepared in the laboratory to establish that the analytical system is free of interference and contamination.
- MDL – method detection limit, an estimation of the lowest level of an analyte that a method can distinguish from noise.
- SDS – Safety Data Sheet
- QAPP – Quality Assurance Program Plan
- QC – Quality Control
- µg – microgram(s)

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4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been exposed (or may have been exposed) to chemical agent and subsequently decontaminated. Handle all samples with caution until negative test results have been released. For all operations involving chemical agents, comply with all laboratory chemical agent safety rules and regulations. Be familiar with and follow safety guidelines contained in Safety Data Sheets (SDS) for the chemicals being used for analysis or being analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, obtain the apparatus and supplies described in the following section.

5.1 Apparatus

Ensure that the following items are available to determine moisture content in solid samples:

- Drying oven – Capable of maintaining a temperature of 105°C for 24 hours.
- Top-loading balance – Capable of accurately weighing to 0.01 g.
- Aluminum weighing boats or equivalent.

6.0 Standards and Quality Control

Document the oven temperature on each day of use. Document the accuracy of the balance before using each day.

7.0 Procedure

To determine moisture content in solid samples, the analyst performs the following tasks:

- Handling and Preparation of Samples for Analysis (Paragraph 7.1).
- Determination of moisture content (Paragraph 7.2).
- Correct results, MDL, and reporting limits for moisture content (Paragraph 8.1).

7.1 Handling and Preparation of Samples for Analysis

Keep samples cold (<6°C but above freezing), prepare and analyze within the holding time specified by the determinative method. Samples must remain in a sealed container until sample preparation and dry weight determination. Do not perform moisture determination before the preparation of the sample. Moisture determination should be done within a reasonable time (less than 40 days) assuming that the samples have remained refrigerated and sealed before and after sampling.

Laboratory QC samples [i.e., method blanks, Laboratory Control Samples (LCS), etc.] do not need a moisture determination. Duplicates (including matrix spike and matrix spike duplicates)

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do not need a separate moisture determination unless the duplicates are taken from a different container.

7.2 Determination of Dry Weight

To determine the moisture content of a sample after the sample has been prepared, the following steps are performed:

1. Allow the sample to come to room temperature.
2. Zero the balance and place a weighing vessel on the balance.
3. Weigh 5-10 g of sample into the weighing vessel.
4. Record the initial weight.
5. Place sample in into a drying oven at 105°C and leave overnight.
6. Weigh the sample in the weighing vessel. The results should be less than the initial weight. In some cases the solid may not have contained any moisture.
7. Record the final weight.
8. Calculate the percent dry weight as follows:

$$\% \text{ dry weight} = \frac{\text{g of dry sample}}{\text{g of sample}} \times 100$$

8.0 Data Reduction

This section presents the procedure to correct results for moisture content. Results for samples requiring a dry weight determination need to be corrected for the moisture content in the sample. The final report will reflect that the results have been corrected for the moisture content in the sample.

8.1 Correct Results, MDL, and Reporting Limits for Dry Weight

The MDL reporting limit and any positive hits are corrected by dividing the value by the %dry weight as follows:

$$\frac{\text{MDL } \mu\text{g/Kg}}{(\% \text{dry weight})} \times 100 = \text{MDL } \mu\text{g/Kg} - \text{dry}$$

$$\frac{\text{Reporting Limit } \mu\text{g/Kg}}{(\% \text{dry weight})} \times 100 = \text{Reporting Limit } \mu\text{g/Kg} - \text{dry}$$

$$\frac{\text{Result } \mu\text{g/Kg}}{(\% \text{dry weight})} \times 100 = \text{Result } \mu\text{g/Kg} - \text{dry}$$

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9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan*.

United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.