

Moisture in Solid Matrices

1. Introduction

The Moisture in Solid Matrices method is performed to determine the percentage of material lost by mass from a sample, after heating at 107°C in a controlled environment. This method is performed primarily to expel moisture from whole coal samples. Moisture results are useful when calculating other analyses to a dry basis.

This method is similar to the ASTM method D 3173 – 03

2. Interfaces with Other Methods

This method relies on:

EGL Method 29, Calibration of Laboratory Scales and Analytical Balances and
EGL Method 25, Method for Sample Login, Control, and Disposition.

3. Materials and Equipment

Drying oven preheated to 107°C and 20 ml ceramic crucibles

4. Procedure

Weigh approximately 1 g of the sample material into a pre-weighed 20 ml ceramic crucible. Record the combined mass of the crucible and the sample material and subtract the mass of the crucible to determine the sample mass before drying. This is the “as determined” mass. Insert the crucible containing the sample in a preheated furnace set at 107°C. After two hours, remove the crucible and place it in a desiccator until it reaches room temperature. Re-weigh the crucible containing the sample, recording the exact mass, and then subtract this mass by the mass of the crucible. This is the “dry” mass of the solid sample.

Calculate the percent moisture using the following equation: Moisture (%) = $((A - B)/A) \times 100$ where A is the “as determined” mass and B is the “dry” mass.

5. Calibration and Quality Control Samples

Check the internal furnace temperature periodically with a data logger. Adjust the temperature control on the front of the furnace to ensure the internal temperature is approximately 107°C (with an allowable range in temperature of 102 to 112°C).

Duplicate samples are analyzed to ensure the quality of data

6. Limits, Precautions, and Interferences

As a precaution, place the furnace under a hood to help dissipate heat and fumes.

7. Acceptance of Data

To determine if the data generated is acceptable, the duplicate sample mass must be within 20% of the original replicate's mass. If the relative deviation of the replicated samples exceeds 20%, the same samples will be placed back into the furnace preheated at 107°C and reweighed. If this does not result in masses which meet the acceptable data criteria, all of the samples will be discarded and new samples will be prepared starting from the beginning of the Moisture in Solid Matrices procedure.

8. Data Handling and Transfer

The sample masses are transferred from the balance to an ExcelTM¹ template electronically. The ExcelTM template calculates the moisture percent for each sample and the percentages are then transferred into a template which is saved in the data to be entered folder on the shared network drive.

9. References

American Society for Testing and Materials International [ASTM], 2007, Annual book of ASTM standards, section five, petroleum products, lubricants, and fossil fuels, Gaseous fuels; coal and coke: West Conshohocken, Pennsylvania, American Society for Testing and Materials International, v. 05.06, p. 349-350.

10. Attachments

There are no attachments included

11. History of Changes

Revision 0: initial issue

¹ Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Government.