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COPPER, LEAD AND ZINC SULPHIDE CONCENTRATES— DETERMINATION OF HYGROSCOPIC MOISTURE IN THE ANALYSIS SAMPLE



STANDARDS ASSOCIATION OF AUSTRALIA
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Australasian Institute of Mining and Metallurgy
Australian Mineral Development Laboratories
Australian Mining Industry Council
CSIRO, Institute of Energy and Earth Resources

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AUSTRALIAN STANDARD

**COPPER, LEAD AND ZINC SULPHIDE
CONCENTRATES—
DETERMINATION OF
HYGROSCOPIC MOISTURE IN
THE ANALYSIS SAMPLE**

AS 2816—1985

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PREFACE

This standard was prepared by the Association's Committee on Copper, Lead and Zinc Ores and Concentrates under the direction of the Minerals Standards Board. Determination of the hygroscopic moisture in analytical samples is an important method because it enables the analytical results obtained for other determinations to be corrected to a dry basis.

Two methods are included for determination of hygroscopic moisture, viz. a loss-in-mass method and a direct gravimetric method. The latter is the preferred method.

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TL Copper, lead and zinc sulfide concentrates - Determination of
hygroscopic moisture in the analysis sample - Gravimetric method (ISO
9599:1991)

TC MN/5

IDT ISO 9599:1991

ABST Specifies a gravimetric loss-in-mass method for the determination of
hygroscopic moisture content. Applicable to copper, lead and zinc
sulfide concentrates with hygroscopic moisture contents between 0.05
percent (m/m) and 2 percent (m/m). This Standard is identical with
and reproduced from ISO 9599:1991.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

COPPER, LEAD AND ZINC SULPHIDE CONCENTRATES—
DETERMINATION OF HYGROSCOPIC MOISTURE IN THE ANALYSIS SAMPLE

1 SCOPE. This standard sets out two methods for the determination of hygroscopic moisture in analysis samples of copper, lead and zinc sulphide concentrates. The two methods are as follows:

- (a) Gravimetric loss-in-mass method.
- (b) Direct gravimetric method.

NOTE: The result of the determination of hygroscopic moisture using this standard shall not be reported as part of the analysis of a concentrate sample. When the reportable hygroscopic moisture content of a commercial shipment of concentrate is required, the procedure described in AS XXXX shall be used.

2 REFERENCED DOCUMENTS. The following standard is referred to in this standard:

AS XXXX Copper, Lead and Zinc Sulphide Concentrates—Determination of Moisture in Bulk Material*.

3 APPLICATION. The methods are applicable to copper, lead and zinc sulphide concentrates free from volatile organic flotation reagents, e.g. kerosene, and with hygroscopic moisture contents in the range 0.05 percent to 5 percent.

NOTE: The gravimetric loss-in-mass method is not applicable to sulphide concentrates which have been shown to be susceptible to oxidation or decomposition. In such cases it is necessary to use the direct gravimetric method. Appendix A provides a procedure by which it can be determined whether or not a concentrate is susceptible to oxidation.

4 GRAVIMETRIC LOSS-IN-MASS METHOD.

4.1 Principle. Drying of the test portion in air at approximately 105 °C and recording the loss in mass.

4.2 Reagents.

4.2.1 Silica gel.

4.3 Apparatus.

4.3.1 Ordinary laboratory equipment.

4.3.2 Laboratory balance, sensitive to 0.1 mg.

4.3.3 Glass weighing bottles with lids, diameter approximately 50 mm.

4.3.4 Laboratory oven, set at 105 °C to 110 °C.

4.4 Sampling and samples.

4.4.1 Sample. Use an air-dried sample of minus 150 µm particle size.

4.4.2 Preparation of the test sample. Take sufficient of the laboratory sample for the required chemical analysis and moisture determination and transfer to a flat dish or tray. Spread the sample evenly in a thin layer. Cover the dish to protect the sample from dust allowing a free flow of air across the top of the sample. Allow the test sample to equilibrate with the laboratory atmosphere for a minimum of 2 h.

4.5 Procedure.

4.5.1 Number of determinations. Carry out the analysis in duplicate on two separate test portions.

4.5.2 Preparation of the weighing bottle. Dry a weighing bottle and lid (4.3.3) by heating in a laboratory oven at 105 °C to 110 °C for 1 h. Transfer the bottle and lid to a desiccator containing a suitable fresh desiccant (4.2.1) and allow to cool for 30 min. Weigh to the nearest 0.0001 g after slightly lifting the lid and quickly replacing it (m_1).

4.5.3 Test portions. Transfer approximately 10 g of pre-equilibrated test sample (4.4.2) directly into the dried and tared weighing bottle (4.5.2). Record the mass of bottle plus sample to the nearest 0.0001 g (m_2). At this stage also weigh test portions required for the determination of constituents for which correction of the analytical values to a dry basis is required and transfer such test portions to the vessels specified.

4.5.4 Determination. Transfer the uncovered bottle with its lid to a laboratory oven and dry at 105 °C to 110 °C for 2 h. Close the bottle, cool in the desiccator for 30 min and reweigh after slightly lifting the lid and quickly replacing it.

Repeat the drying at 105 °C to 110 °C, the cooling in desiccator for 30 min and weighing steps for as many times as necessary to achieve constant mass in the test portion. Record the constant mass (m_3).

4.6 Expression of results. The hygroscopic moisture content, A , as a percentage by mass is calculated from the following formula:

$$A = \frac{m_2 - m_3}{m_2 - m_1} \times 100$$

where

m_1 = mass of the dried weighing bottle, in grams

m_2 = mass of the weighing bottle with concentrate before drying, in grams

m_3 = mass of the weighing bottle with concentrate after drying, in grams.

Calculate the hygroscopic moisture content of the sample to the second decimal place.

5 DIRECT GRAVIMETRIC METHOD.

5.1 Principle. Heating of the test portion at 105 °C to 110 °C in a stream of dry, oxygen-free nitrogen or other inert gas and collection of the evolved moisture in an absorption tube containing a desiccant. Calculating the moisture content of the test sample from the increase in mass (less the blank determination).

* In course of preparation.

