
INTERNATIONAL STANDARD



348

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Hard coal — Determination of moisture in the analysis sample — Direct volumetric method

Houille — Détermination de l'humidité de l'échantillon pour analyse — Méthode volumétrique directe

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 27 has reviewed ISO Recommendation R 348 and found it technically suitable for transformation. International Standard ISO 348 therefore replaces ISO Recommendation R 348-1963 to which it is technically identical.

ISO Recommendation R 348 was approved by the Member Bodies of the following countries :

Austria	Germany	Romania
Bulgaria	India	Spain
Burma	Italy	Turkey
Chile	Japan	United Kingdom
Czechoslovakia	Mexico	U.S.S.R.
Denmark	Poland	Yugoslavia
France	Portugal	

The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

Belgium	New Zealand
Canada*	South Africa, Rep. of*
Netherlands	U.S.A.*

No Member Body disapproved the transformation of ISO/R 348 into an International Standard.

* Subsequently, these Member Bodies approved the Recommendation.

Hard coal – Determination of moisture in the analysis sample – Direct volumetric method

0 INTRODUCTION

Since coal is hygroscopic, its moisture will vary with change of humidity of the atmosphere, and the moisture in the analysis sample is, therefore, determined whenever portions are weighed out for other analytical determinations, for example volatile matter, calorific value, carbon and hydrogen, etc. If all the portions taken for analysis are weighed out on the same day and at about the same time, and if the analyses are proceeded with without delay, one determination of moisture will suffice.

1 SCOPE AND FIELD APPLICATION

This International Standard specifies a method of determining the moisture content of the analysis sample of hard coal using a volumetric procedure. An alternative gravimetric method is given in ISO 331.¹⁾

2 PRINCIPLE

The coal is heated in a flask under reflux conditions with boiling toluene. The moisture from the coal is entrained by the toluene vapour and carried to a condenser fitted with a graduated receiver. The water then separates in the receiver, to form the lower layer, whilst the excess toluene is returned to the distillation flask by means of an overflow. The moisture in the coal is calculated from the mass of the sample and the amount of water collected.

3 REAGENTS

All reagents shall be of analytical reagent quality and distilled water shall be used throughout.

3.1 Toluene (see note), boiling point 110 °C.

NOTE – In view of the low solubility of water in toluene, it can be shown that only a very small possibility of error in the determination may arise from variation in the condition of saturation of the entraining reagent. In order to reduce this error to insignificance, however, it is recommended as a precaution that the reagent should be used in the same condition during use as during calibration of the apparatus.

4 APPARATUS

All graduated apparatus shall be of the best analytical quality obtainable and the balance used shall be sensitive to 10 mg.

4.1 Distillation flask, of 500 ml minimum capacity.

4.2 Condenser, of 200 mm minimum length, fitted at its lower end with an extended lip to direct the distillate into the receiver along its axis without touching the sides.

4.3 Receiver, for the condensed water, graduated in 0,1 ml.

The condenser, the receiver and the distillation flask are fitted together by means of ground glass joints (see note). An overflow tube connected to the receiver or to the lower portion of the condenser permits the return of condensed toluene to the distillation flask. The condenser may be fitted to condense either an upward or a downward vapour stream.

NOTE – It is important that the receiver and the condenser shall be clean. To ensure this, they shall be treated with a cleansing reagent, such as a strong solution of potassium dichromate in sulphuric acid.

4.4 Glass tubing, pieces about 5 mm in diameter and 5 mm long, with sharp edges.

4.5 Spray tube, glass, through which toluene can be supplied to wash down the inner surface of the condenser (this precaution is required only when an upward-flow condenser is employed).

5 PREPARATION OF SAMPLE

The coal used for the determination of moisture content is the analysis sample ground to pass a sieve of 0,2 mm aperture. If necessary, the sample is exposed in a thin layer for the minimum time required to reach approximate equilibrium with the laboratory atmosphere.

1) ISO 331, Coal – Determination of moisture in the analysis sample – Direct gravimetric method.