

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 625

DETERMINATION OF CARBON AND HYDROGEN
IN COAL AND COKE
BY THE LIEBIG METHOD

1st EDITION

October 1967

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BRIEF HISTORY

The ISO Recommendation R 625, *Determination of Carbon and Hydrogen in Coal and Coke by the Liebig Method*, was drawn up by Technical Committee ISO/TC 27, *Solid Mineral Fuels*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question by the Technical Committee began in 1952 and led, in 1958, to the adoption of a Draft ISO Recommendation.

This first Draft ISO Recommendation (No. 236) was circulated in May 1958 to all the ISO Member Bodies for enquiry. As the results of this consultation were not considered satisfactory the Technical Committee presented a Second Draft ISO Recommendation, which was circulated to all the Member Bodies in October 1963 and which was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Argentina	Germany	Republic of South Africa
Australia	Greece	Romania
Austria	India	Spain
Belgium	Italy	Switzerland
Bulgaria	Korea, Rep. of	Turkey
Canada	Netherlands	United Kingdom
Chile	New Zealand	U.S.A.
Czechoslovakia	Poland	U.S.S.R.
Denmark	Portugal	Yugoslavia

One Member Body opposed the approval of the Draft:

France

This Second Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in October 1967, to accept it as an ISO RECOMMENDATION.

Amendment 1 – November 1971 – to ISO Recommendation R 625-1967

Amendment 1
to ISO Recommendation R 625-1967DETERMINATION OF CARBON AND HYDROGEN
IN COAL AND COKE
BY THE LIEBIG METHOD**Section 3, REAGENTS**

Delete the 3rd line of clause 3.1.

Delete clause 3.2.

Delete the 1st sentence of the Note.

Delete the 2nd line of clause 3.3.

Delete clause 3.4.

Accordingly renumber clauses 3.3 to 3.10.

Section 4, APPARATUS*Clause 4.1*

Delete “or calcium chloride (3.2)”, “or potassium hydroxide (3.4)” and “or calcium chloride (3.2)” in the 3rd, 5th and 6th lines.

Replace “3.3” by “3.2” in the 5th line.

Clause 4.3

Delete “or calcium chloride (3.2)” in the 3rd, 6th and 9th lines, and “or potassium hydroxide (3.4)” in the 8th line.

Replace “3.5” by “3.3” and “3.3” by “3.2” in the 5th and 8th lines respectively.

Section 5, PREPARATION OF THE APPARATUS AND BLANK DETERMINATION

Replace all the reference numbers 3.6 to 3.9 by 3.4 to 3.7 respectively.

BRIEF HISTORY

Amendment 1 to ISO Recommendation R 625-1967, *Determination of carbon and hydrogen in coal and coke by the Liebig method*, was drawn up by Technical Committee ISO/TC 27, *Solid mineral fuels*, the Secretariat of which is held by the British Standards Institution (BSI).

Draft ISO Recommendation No. 1937 was drawn up on this subject, and was circulated to all the ISO Member Bodies for enquiry in April 1970. It was approved by the following Member Bodies :

Australia	India	Sweden
Belgium	Iran	Switzerland
Canada	Italy	Turkey
Chile	Korea, Rep. of	U.A.R.
Czechoslovakia	Netherlands	United Kingdom
Denmark	New Zealand	U.S.A.
France	Poland	U.S.S.R.
Germany	Portugal	Yugoslavia
Greece	South Africa, Rep. of	

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as AMENDMENT 1 to ISO Recommendation R 625-1967.

DETERMINATION OF CARBON AND HYDROGEN IN COAL AND COKE BY THE LIEBIG METHOD

1. SCOPE

This ISO Recommendation describes the Liebig method of determining the total carbon and the total hydrogen in hard coal, brown coal and lignite, and coke; the results include the carbon in the carbonates and the hydrogen combined in the moisture and in the water of hydration of silicates. A determination of moisture is carried out at the same time and the appropriate correction is applied to the hydrogen value obtained by combustion. A determination of carbon dioxide may also be made and the total carbon value corrected for the presence of mineral carbonates.

2. PRINCIPLE

The sample is burned in a current of oxygen, the products of the incomplete combustion being burned over copper oxide; all the hydrogen is converted to water and all the carbon to carbon dioxide. These products are absorbed by suitable reagents and determined gravimetrically. Oxides of sulphur are retained by lead chromate, chlorine by silver gauze and oxides of nitrogen by granular manganese dioxide.

NOTE. — Oxides of nitrogen formed in the combustion would in the absence of precautions, be absorbed by the soda asbestos and considered as carbon dioxide. The error in the carbon determination thus caused, of the order of 0.2 % of carbon, is substantially avoided by the use of a guard-tube (see Fig. 1, page 9) in which the gases pass through an annular space to allow oxidation of nitric oxide to nitrogen peroxide, which is absorbed by the manganese dioxide.

If water is condensed in the first absorber, some nitrogen peroxide may dissolve in it and be considered as water. Because of the conversion factor from water to hydrogen, the error in the hydrogen determination thus caused is small, of the order of 0.05 % of hydrogen. This can be avoided only by heating the absorption tube to a sufficient temperature to prevent condensation of water.

3. REAGENTS

All reagents should be of analytical reagent quality. Distilled water should be used throughout.

3.1 Magnesium perchlorate, anhydrous (anhydrone). Free from dust and within the size range 2.4 to 0.4 mm; preferably within the size range 1.2 to 0.7 mm (see Note below)

or, if magnesium perchlorate is not readily available,

3.2 Calcium chloride, anhydrous. Freshly prepared and of size range 1.2 to 0.7 mm.

NOTE. — Calcium chloride should be saturated with carbon dioxide before use; many varieties of anhydrone do not need this conditioning treatment, but a new source should be checked in this respect before use. Regeneration of magnesium perchlorate should not be attempted, owing to the risk of explosion. When exhausted the magnesium perchlorate should be washed down the sink with a current of water.