

SLOVENSKI STANDARD SIST ISO 609:1998

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Solid mineral fuels -- Determination of carbon and hydrogen -- High temperature combustion method

iTeh STANDARD PREVIEW

Combustibles minéraux solides --- Dosage du parbone et de l'hydrogène -- Méthode par combustion à haute température

SIST ISO 609:1998

Ta slovenski standard je istoveten z: SO 609:1996

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INTERNATIONAL STANDARD

ISO 609

Second edition 1996-02-15

Solid mineral fuels — Determination of carbon and hydrogen — High temperature combustion method

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Reference number ISO 609:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 609 was prepared by **Technical Committee** ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 5, *Methods of analysis*. SIST ISO 609:1998

This second edition cancels and replaces the first edition (ISO 609:1975), which has been technically revised.

Annex A of this International Standard is for information only.

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International Organization for Standardization

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Introduction

An alternative method to that specified in this International Standard is given in ISO 625:1996, *Solid mineral fuels* — *Determination of carbon and hydrogen* — *Liebig method.*

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INTERNATIONAL STANDARD . ISO

Solid mineral fuels — Determination of carbon and hydrogen — High temperature combustion method

1 Scope

This International Standard specifies a method of determining the total carbon and the total hydrogen in hard coal, brown coal and lignite, and coke, by a high temperature combustion method.

The results include the carbon in the carbonates and the hydrogen combined in the moisture and in the water of constitution of silicates. A determination of moisture is carried out at the same time, and an appropriate correction is applied to the hydrogen value obtained by combustion. A determination of <u>carbonO 609</u>

dioxide may also be made and the total carbon valued and sist 91900 and corrected for the presence of mineral carbon ates b9c4/sist-iso-609-1928

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 331:1983, Coal — Determination of moisture in the analysis sample — Direct gravimetric method.

ISO 687:1974, Coke — Determination of moisture in the analysis sample.

ISO 925:1980, Solid mineral fuels — Determination of carbon dioxide content — Gravimetric method.

ISO 1015:1992, Brown coals and lignites — Determination of moisture content — Direct volumetric method.

ISO 1170:1977, Coal and coke — Calculation of analyses to different bases.

ISO 1988:1975, Hard coal — Sampling.

ISO 2309:1980, Coke --- Sampling.

S.Iteh.al) ISO 5068:1983, Brown coals and lignites — Determi-609:1985 method. ds/sist/1000ad-3b58-4c65-a537-

ISO 5069-2:1983, Brown coals and lignites — Principles of sampling — Part 2: Sample preparation for determination of moisture content and for general analysis.

3 Principle

A known mass of coal or coke is burnt in a stream of oxygen, at a temperature of 1 350 °C, in a tube impervious to gases. All the hydrogen is converted to water and all the carbon to carbon dioxide. These products are absorbed by suitable reagents and determined gravimetrically. The chlorine and oxides of sulfur which are formed are retained by a silver gauze roll at the outlet end of the tube.

4 Reagents and materials

WARNING — Care should be exercised when handling reagents, many of which are toxic and corrosive.

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity. **4.1 Magnesium perchlorate**, anhydrous, less than 1,2 mm in size and preferably within the size range 1,2 mm to 0,7 mm.

WARNING — Due regard must be taken of local regulations when disposing of exhausted magnesium perchlorate. Regeneration of magnesium perchlorate must not be attempted, owing to the risk of explosion.

4.2 Sodium hydroxide on an inert base, preferably of a coarse grading, for example 3,0 mm to 1,5 mm, but not finer than the grading 1,2 mm to 0,7 mm, and preferably of the self-indicating type.

4.3 Aluminium oxide (alumina), finely divided, approximately 0,1 mm in size.

4.4 Sodium tetraborate, standard volumetric solution, $c(Na_2B_4O_7) = 0.025 \text{ mol/l}.$

Dissolve 9,534 2 g of sodium tetraborate decahydrate in water and dilute to 1 litre. Mix thoroughly.

4.9 Air, compressed.

4.10 Glass wool.

5 Apparatus

5.1 Analytical balance, capable of weighing to the nearest 0,1 mg.

5.2 Graduated glassware, conforming to the requirements for class A in the International Standards prepared by ISO/TC 48, *Laboratory glassware and related apparatus.*

5.3 Two purification trains, one for absorbing water vapour and carbon dioxide from the oxygen used for the combustion and the other for similarly treating the air used for sweeping out the absorption train before and after a determination. Assemble each train using a series of U-tubes or Midvale tubes containing the following reagents in the order stated, in the direction of flow:

a) magnesium perchlorate (4.1) for absorbing water;

4.5 Hydrogen peroxide, approximately 30 % (*m/m*). b), sodium hydroxide on an inert base (4.2) for ab-(standards.itsorbing dioxide;

4.6 Pure silver gauze, of mesh approximately 1 mm, made of wire approximately 0,3 mm in diam-ISO 60¢)19m agnesium perchlorate for absorbing the water eter. https://standards.iteh.ai/catalog/standards/sist/evolved_in_the_reaction between carbon dioxide 8cf42e26b9c4/sist-iso-6and sodium hydroxide.

4.7 Oxygen, hydrogen-free, preferably prepared from liquid air and not by electrolysis. Electrolytically prepared oxygen shall be passed over red-hot copper oxide before use to remove any trace of hydrogen.

4.8 Mixed indicator solution

4.8.1 Solution A

Dissolve 0,125 g of 2-(4-dimethylaminophenylazo)benzoic acid, sodium salt (methyl red) in 100 ml of water.

4.8.2 Solution B

Dissolve 0,083 g of 3,7-bis(dimethylamino)phenothiazine-5-ylium chloride (methylene blue) in 100 ml of water. Store in a dark bottle.

4.8.3 Mixed solution

Mix equal volumes of solution A and solution B. Store in a dark bottle. Discard the mixed solution after 1 week. The purification trains shall be large enough to render frequent recharging unnecessary, even with continuous use.

NOTE 1 Midvale tubes that have been freshly packed with absorbent and used in the purification train are thereby conditioned for subsequent use in the absorption train.

5.4 Combustion assembly

5.4.1 Heating unit, an electrically heated furnace or furnaces, designed to carry a combustion tube (5.4.2) and heat it to 1 350 °C over a distance of 125 mm in the hot zone, and yield a temperature-distribution profile similar to that shown in figure 1. The heating unit normally requires an auxiliary furnace to ensure that the silver gauze roll (5.9) is maintained at the correct temperature (approximately 600 °C to 800 °C). Suitable furnaces are, for example:

- a) molybdenum or tungsten wire wound;
- b) platinum or platinum-rhodium wire wound;
- c) heated by silicon carbide rods.

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ISO 2309:1980, Coke --- Sampling.

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