International

ISO 7404-5

Coal — Methods for petrographic analysis —

Part 5: Method of determining microscopically the reflectance of vitrinite

Charbon — Méthodes d'analyse pétrographique —

Partie 5: Méthode de détermination au microscope du pouvoir réflecteur de la vitrinite

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This document was prepared by Technical Committee ISO/TC 27, *Coal and coke*, Subcommittee SC 5, *Methods of analysis.*

This fourth edition cancels and replaces the third edition (ISO 7404-5:2009), which has been technically revised.

The main changes are as follows:

— input from the International Committee for Coal and Organic Petrology (ICCP) has been added.

A list of all parts in the ISO 7404 series can be found on the ISO website.

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Petrographic analyses have been recognized internationally as important in the context of the genesis, vertical and lateral variation, continuity, metamorphism and usage of coal. The International Committee for Coal and Organic Petrology (ICCP) has made recommendations concerning nomenclature and analytical methods and has described in detail the characteristics of a wide range of coals[1][2][3][4][5][6]. This document incorporates many useful comments made by members of the ICCP and by member bodies of ISO/TC 27.

Petrographic analyses of a single coal provide information about the rank, the maceral and microlithotype compositions and the distribution of minerals in the coal. The reflectance of vitrinite is a useful measure of coal rank and the distribution of the reflectance of vitrinite in a coal blend, together with a maceral group analysis, can provide information about the rank and type of the coal and important chemical and technological properties of the blend.

The ISO 7404 series is concerned with the methods of petrographic analysis currently employed in characterizing coal in the context of its technological or geological use, or both. It establishes a system for petrographic analysis.

The method of determining the reflectance of vitrinite is applicable for low-, medium- and high-rank coals [7].

The properties of a given coal are determined by the proportions and associations of the macerals and minerals present and by the rank of the coal. The reflectance of the vitrinite in the coal can be used as an indicator of rank, independent of the petrographic composition. Vitrinite reflectance increases progressively with rank. The reflectance of vitrinite has various other applications, such as the characterization of bulk samples and cargoes. For coal blends, the measurement of the vitrinite reflectance profile can permit the identification of the component coals and permit the estimation of the relative abundance of the component coals within the blend.

The reflectance of the macerals of the vitrinite group can vary significantly in a single coal seam and therefore the value of the reflectance obtained depends also on the choice of the macerals used for measurement. Reflectance measurements are made on one or more of the macerals of vitrinite. Consequently, a vital step in the measurement of vitrinite reflectance is the identification of vitrinite and its various macerals or maceral varieties. For this purpose, reference can be made to ISO 7404-1, the ICCP handbook[1] and subsequent ICCP authored journal articles[2][5].

For rank determination of single-seam coals, normally the reflectance of collotelinite[2] (ulminite B in lignites, the equivalent of low-rank B and C[5]) is determined. In cases where collotelinite (or in low-rank coals, ulminite B) is not present in sufficient amounts, reflectance analysis on other vitrinite macerals is performed. Reflectance analysis on various vitrinite macerals can also be applied for technological purposes and to coal blends; see 8.3.1. The reflectance value obtained also depends on whether maximum or random reflectance measurements are made, so it is necessary to specify the type of measurement. All of these analysis procedures are applicable to single-coal seams or to blends providing that adequate (see 8.3.1) reflectance measurements are made in compliance with an unbiased sampling procedure on a representative sample.

For vitrinite reflectance analysis, the ICCP regularly run the Single Coal Accreditation Program (SCAP) for accrediting petrologists in the analysis of single seam coals.

NOTE As the ISO 7404 series covers coals of all rank, the term “vitrinite” as used in this document includes vitrinite as well as huminite. Reference can be made to ISO 7404-1 for details. The equivalent to collotelinite in lignites is ulminite B. Reflectance measurement on lignites is performed on huminite.