

The Distribution of Boron in Romanian Coals

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This study presents the distribution of boron in Romanian coals. The analyses of boron from different types of Romanian coals have been done in the laboratory using the spectroscopy emission technique. This method is accurate and precise for the determination of boron from different types of coals. A series of processes regarding the coal structure are defined through the knowledge of boron concentration from different coal deposits.

Keywords: boron, coal, spectroscopy

Boron is classified as an element of great concern to the environmental health and quality, in relation to its release during coal utilization and waste disposal.

Boron has also been classified as an indicator for marine paleoenvironments of coal, sediments and sedimentary rocks [1-7].

Analyses for boron in coal and geological materials have been generally done by optical emission spectroscopy which has good sensitivity.

Boron is a substantial component of buried organic debris (100 ppm), because it is an essential nutrient in many vascular plants and is also enriched in marine plankton.

As a result, the decomposition and thermal alteration of organic compounds from plants will affect the isotopic composition of pore fluids.

The present study seeks to determine the concentration of boron in different types of Romanian coals.

Experimental part

The quantitative determination of petrographical components, clay compound, pyrite and carbonates has been done with a high precision petrographic microscope.

In this study we used samples of lignite and pit coal from different Romanian coal deposits.

Boron concentration in coal has been determined with a laser spectrum analyzer system L.M.A -1 Carl Zeiss Jena engaged at a network spectrograph P.G.S -2 C.Z.J.

The input power of the laser spectrum analyzer (laser pump) is 1000 W and the output power of the laser fascicle is 0.1 W.

The spectrograph has a grating of 651 lines / mm, which assures dispersion of 0.7 m/mm.

Results and discussions

The results of the petrographical analysis for pit coal are shown in table 1 and for lignite in table 2.

The carbopetrographic components in advanced stages of carbonification adsorb more boron than the components from inferior stages (textinite).

The boron captivation can be correlated with the paleosalinization of the marine water where the deposit was formed.

In table 3 and 4 is presented the boron concentration in pit coal from Valea Jiului coal mine and for lignite from Rovinari coal mine.

From the data in table 3, it can be observed that the organic mass absorbs more boron than the mineral part.

Table 1
CARBOPETROGRAPHIC ANALYSIS OF PIT COAL

Petrographical constituents	Samples from		
	Vulcan %	Lupeni %	Petrila %
Vitrinite	59.4	64.5	62.4
Telinite	5.4	9.1	2.5
Exinite	3.6	3.3	0.7
Inertinites	0.4	0.4	0.3
Pyrites	2.4	1.8	2.3
Clay minerals	18.8	8.2	11.5
Carbonates	0.4	0.4	3.6
Other minerals	9.6	12.3	16.7

Table 2
PETROGRAPHIC ANALYSIS OF LIGNITES FROM ROVINARI

Constituents from lignite from Rovinari	Lignite from Rovinari (%)
Textinite	30.0
Textoulminite	11.5
Ulminite	4.0
Atrinite	16.5
Densite	7.5
Gelinite	4.0
Inertite + Sclerotinite	2.5
Rezinite	1.0
Clay minerals	6.5
Mineral mass with Fe	13.0
Pyrite	3.0

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Table 3
DISTRIBUTION OF BORON IN COALS FROM VALEA JIULUI

Petrographic constituents	Samples from	Concentration of boron (ppm)
Vitrinite	Coroiesti	64.5
	Lupeni	5000
Telinite	Petrila	800
	Coroiesti	3000
Inertinite	Petrila	10
	Coroiesti	80
Carbagilit	Coroiesti	50
	Lupeni	1000
Other minerals	Lupeni	50
Pirite	Petrila	Traces
	Lupeni	Traces

The data values in table 3 show that the maximum accumulation of boron is found in vitrinite and telinite – from coals in the Coroiesti coal mine.

From table 4 it can be observed that the ulminite accumulates an approximately value of 1600 ppm boron.

Due to the salinity of the Sarmatic Sea, boron is found especially in the carbopetrographic components of pit coal.

In the cellular textinite, gelinite and in danks the boron accumulation is above 300 ppm.

Because of a high concentration of ulminite the concentration of boron in texto-ulminite is 1000 ppm.

Table 4
THE DISTRIBUTION OF BORON IN COALS FROM ROVINARI

Petrographic Components	Concentration of boron (ppm)
Cellular textinite	100
Textoulminite	1000
Ulminite	1600
Gelinite	10
Danks	300

Conclusions

The concentration of boron in Romanian coals is found in the organic mass, especially in ulminite, in young coals and in vitrinite, in pit coal (colinite) and also in telinite but with a lower concentration than ulminite and vitrinite.

The boron accumulation in clay, mainly in ilite, indicates the salinity of the contiguous sea coal deposits.

The clay from young coals has a concentration value of 300 ppm boron and can be used for a complex study for the determination of boron in ilite.

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