Short communication

Comparative Study of Humic Acid Extract with Ammoniacal Solutions from Coals in Inferior Rank and from Romanian Soil

JENY CHIRIAC, FRUMUZACHE BARCA*
University Politehnica of Bucharest, 1-3 Polizu Str., 011061, Bucharest, Romania

The paper shows the similitude that exists between humic acids extracted from Roşia (Jiu) and Schitu Goleşti Romanian mining sites for coals with inferior rank and those extracted from soil. The possibility of utilization of useless coal for energy_industry to introduce organic mass and humic acids in poor soils is sustained by these similarities. These coals introduced in soil could be ecological materials which give a better soil quality.

Key words: humic acids, brown coal, soil

The study refers to the possibility to enrich the content of organic mass and humic acids from soil, by mixing it with an ecological material that comes from fossil coals having an inferior rank of carbonization.

In this study samples of coals uselles for energy industry, extracted from Rosia and Schitu Golesti coal pits were analyzed to demonstrate the structural similitude between coals and soil samples both from their characteristics point of view and from the similarities of the humic acids extracted from these materials.

Experimental part

Coal samples from Oltenia area, Roşia and Schitu Goleşti coal pits useless for energy industry and soil samples were studied. The investigations were carried out in accordance with international standardized methods (ISO norms) and also with the valid Romanian standards.

The selection was made in order to use the coal in inferior stage of carbonization with structural elements close to those of soil.

There were made also researches to establish the possibilities of unfettering humic acids and the enlargement of soil nitrogen content by ammonia addition.

There were studied the composition and structural factors and there were made also researches through IR absorbance spectroscopy.

The chemical and technical characteristics of studied materials are presented in table 1. Knowing that the active substance of soil is represented by humic acids, there were made extractions of humic acids with concentrated hydroxide ammonia (300 g/L).

It was used hydroxide ammonia for establishing also the possibility of enlargement the soil nitrogen quantity.

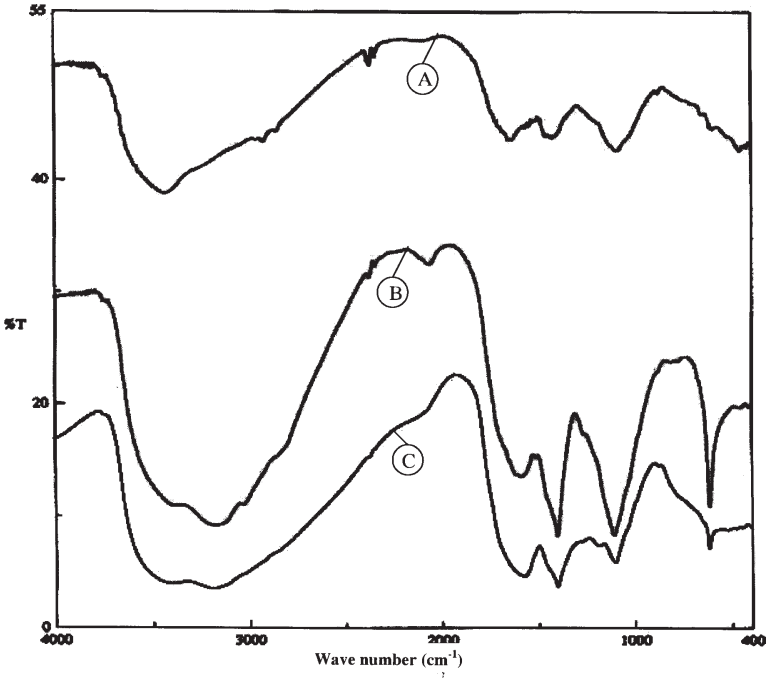
Table 1
CHEMICAL AND TECHNICAL CHARACTERISTICS OF ROSIA AND SCHITU GOLESTI COALS IN COMPARISON WITH THOSE OF SOIL

Specification	Roşia				Schitu Goleşti				Soil			
	Initial sample		Combustible mass		Initial sample		Combustible mass		Initial sample		Combustible mass	
	Symbol	Values %	Symbol	Values %	Symbol	Values %	Symbol	Values %	Symbol	Values %	Symbol	Values %
Humidity	W^i	41,52	-	-	W^i	35,61	-	-	W^i	20,22	-	-
Ash	A^i	26,05	-	-	A^i	24,80	-	-	A^i	66,37	-	-
Carbon	C^i	18,90	C^{waf}	58,53	C^i	23,13	C^{waf}	59,32	C^i	7,52	C^{waf}	56,09
Hydrogen	H^i	1,91	H^{waf}	5,90	H^i	2,40	H^{waf}	5,93	H^i	0,80	H^{waf}	6,02
Sulphur	S^i	0,73	S^{waf}	2,25	S^i	0,85	S^{waf}	2,11	S^i	0,11	S^{waf}	0,85
Nitrogen	N^i	0,52	N^{waf}	1,32	N^i	0,64	N^{waf}	1,58	N^i	0,25	N^{waf}	1,84
Oxygen	O^i	10,37	O^{waf}	32,00	O^i	12,57	O^{waf}	1,06	O^i	4,73	O^{waf}	35,20
Atomic ratio H/C	-	-	H/C	1,21	-	-	H/C	1,20	-	-	H/C	1,29

* *Tel.: 0214023969*

Table 2
THE QUANTITIES OF HUMIC ACIDS EXTRACTED FROM ROSIA AND SCHITU GOLESTI COALS AND SOIL SAMPLES

Specification	Measure	Studied Material		
		Roşia Coal	Schitu Goleşti Coal	Soil
Humic acids reported to sample	%	10,04	6,30	3,00
Humic acids reported to organic (combustible) mass	%	30,84	18,47	19,47



CONVENTIONAL SIGNS
A –Superior row: Schitu
B – Middle row: Roşia
C –Inferior row: soil

Fig. 1. The IR spectra ensemble of humic acids extracted from Rosia and Schitu Golesti coals and also of humic acids extracted from soil

The results obtained this way, namely, the quantity of humic acids extracted from Roşia and Schitu Goleşti coals and soil samples, are presented in table 2.

For spectra comparison there were presented also the cumulated spectra (fig.1).

The reported spectra and data from tables 1 and 2 show the following aspects:

- the structure of humic acids obtained from soil is similar to those obtained from inferior coals in diverse stages of carbonization;
- the IR absorption level of humic acids extracted from soil is smaller than that of humic acids extracted from Roşia and Schitu Goleşti coals;
- the IR absorption level increases with the increase of carbonization degree and that shows a great development of aromatic surface of humic acids that proceed from coals in comparison with that of humic acids that proceed from soil. This fact does not raise any problem in soil upgrading because the quality of soils is given by marginal groups;
- the marginal groups of humic acids extracted from coals are similar to those of humic acids extracted from soil that suggests the following conclusion: the introduction of coal wastes in soil is very useful.

Conclusions

The introduction of brown coal wastes in soil has as effect, the introduction of organic mass in soil on the one hand and on the other hand the introducing of humic acids useful for plant growing.

The organic mass from brown coals introduced in soil, that comes into contact with the air, generates continuously humic acids that have a very positive effect for soil regeneration.

The ammonia can be introduced in soil as solutions that generate soluble ammonia humites, very useful in the process of plant growing.

The introducing of brown coal wastes is ecological because of the natural products utilization, which gives the possibility to grow plants without accumulation of harmful substances.

Due to the similar structure of brown coals and soil, coals in inferior stages of carbonization represent the main material that can be introduce in soil without its alteration.

References

1.BLUM I., BARCA F, Chimia şi prepararea cărbunilor, Ed. Didactică şi Pedagogică, Bucureşti, 1968, p. 5
2.BARCA F., PENU A., Procese primare de preparare a cărbunilor, Ed. UPB 1991, p. 8
3.LOWRY H.H., Coal Chemistry, New York 1980

Manuscript received: 16.07.2008