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RESEARCH ON THE FLY ASH CHARACTERISTICS FROM THERMAL POWER STATIONS

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Abstracts: *The term "fly ash" is often used to describe any fine particulate material precipitated from the stacks gases of industrial furnaces burning solid fuels. The amount of fly ash collected from furnaces on a single site can be vary from less than one ton per day to several tons per minute. The characteristics and properties of different fly ashes depend on the nature of fuel and the size of furnace used.*

Keywords: *fly ash caracteristics, artificial pozzolan, granulometry, etc.*

INTRODUCTION

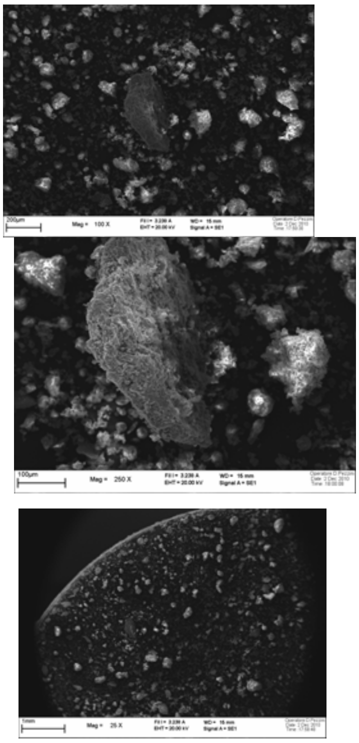
Fly ash is an artificial pozzolan produced when pulverized coal is burned in electric power plants. Fly ash is generally captured by electrostatic precipitators or other particle filtering equipment, before the combustion gases to arrive at the exhaust flues of power stations. The characteristics of coal, including the sterile content, extraction mode and the grinding technologies and burning it, and the manner to evacuation / collection at fly ash determine their characteristics. Knowing the characteristics in very important to establish the areas of use in various fields.

Fig.1. *Natural size of fly ash*

1. EXPERIMENTAL METHODS AND RESULTS

In a first step has been determined the physical characteristics as the appearance and the form. Depending on the nature of coal and combustion conditions, may have a variable color of the fly ash from gray to brown (figure 1).

To analyze in detail the appearance and the form of the grains of fly ash, we realized a microscopic study. The microscopic structure of fly ash was determined with SEM Model LEO 1450 VP.



SEM of fly ash ***Fig. 2.***

In figure 2 can be observed the granules have irregular the form, characteristic of the fly ash results of the burn of lignite, they have a spongy structure, agglomerated in large groups, hydraulically inert. They are usually empty, but sometimes present attached the particles of aluminum-silicate, Fe, Ca, K, etc (figure 3).

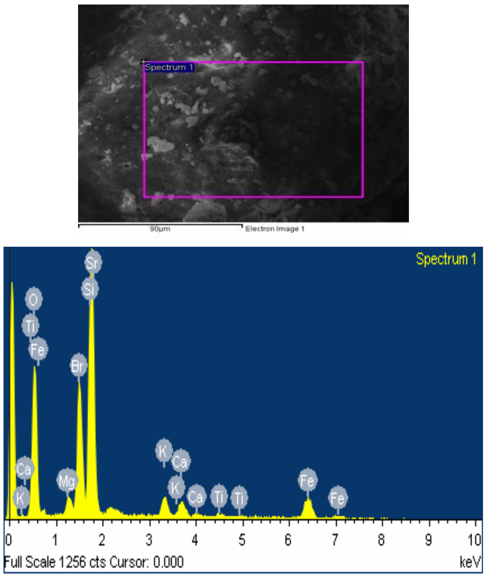


Fig. 3. *SEM-EDS of fly ash*

In terms of granulometry the fly ash fall in a range between 0.2 and 200μm. In figure 4 is present the curve of granulometry of the fly ash. The determination was made practical by sifting a certain amount of material through the set standard.

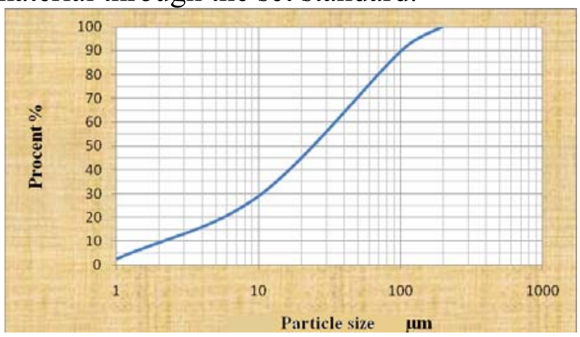


Fig. 4. *Curve of granulometry of the fly ash*

Regarding the chemical characteristics we performed determinations on the oxide composition.

The oxide composition was determined by XRF method (X-Ray Fluorescence) with spectrometer XRF BRUKER S8 TIGER. The results achieved are presented in Table 1.

Table 1. *The oxide composition of fly ash*

Nr. proba	Compoziție chimică %							
	SiO_2	**Fe_2O_3**	**Al_2O_3**	**CaO**	**MgO**	**SO_3**	**Na_2O**	**K_2O**
1	54,12	8,86	22,02	6,05	2,52	0,87	0,98	2,4
2	54,18	8,89	22,03	5,97	2,54	0,98	0,42	2,41
3	55,42	8,28	23,33	3,94	2,59	0,96	0,64	2,77
4	55,00	8,96	21,89	6,13	2,60	1,37	0,54	2,46
5	54,13	8,56	22,13	4,86	2,59	1,36	0,62	2,66
6	54,36	8,23	22,03	5,96	2,56	0,98	0,42	2,45
7	54,42	8,12	22,12	5,56	2,51	1,23	0,39	2,36
8	55,13	7,56	23,0	5,13	2,48	1,02	0,32	2,21

As can be seen the sum of the dominant components SiO_2, Al_2O_3, Fe_2O_3 and CaO is more high 70%, which certifies the good hydraulic capacity of fly ash, proprietary that provides a high degree of recovery.

To elucidate the molecular structure of fly ash we examined in the IR spectrum (Figure 5) in the form aqueous emulsion with polydimethylsiloxane with Nicolet FTIR spectrometer.

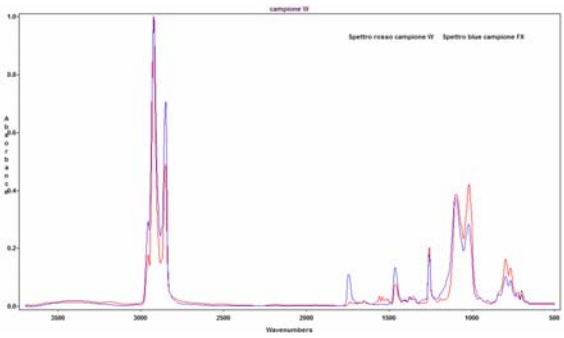


Fig. 5. *IR spectrum of fly ash*

Is observed that, in the sample of the fly ash is present a pic at 1746 cm^{-1} specific of ester group.

This properties demonstrates the good capacity of ashes to be used in various fields such as raw materials or materials added.

2. CONCLUSIONS

The fly ash used in the determination is generally homogeneous, the main chemical components were within limits (table 2).

Components	**Variation limit %**	
	Minimum	**Maximum**
SiO_2	49	56
Al_2O_3,	19	23
Fe_2O_3	4	9
CaO	4	7

Ash from thermal plants is present and prospective major industrial waste which, due to the chemical composition and hydraulic properties can be sources of new raw materials recovered in various fields.

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