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ENVIRONMENT ECOLOGICAL PROCESS IN HUNEDOARA AREA THROUGH REINSERTION IN ECONOMIC CIRCUIT OF SCRAP AND PULVEROUS WASTE

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ABSTRACT:
The Hunedoara area, from industrialization viewpoint is placed before 1989 on 3 places after Bucuresti and Brasov. Representative was the iron and steel, energetic and mining industries. Through specific technological process, besides the main products have output a series of residues, that in 95% from cases were deposited on dumps and ponds.
In paper is presented a synthesis of results obtained of authors regarding to reinsertion in the economic circuit of scrap and pulverous waste existing in Hunedoara area.
Through these capitalization of wastes in the iron and steel industry I done substantial economies in cost-price of final product, on aside, and but the other side are in progress an ecological process of environment Hunedoara area through give back of occupied surfaces with these waste to the natural frame.
KEY WORDS:
waste, recycling, siderurgy, pollution, industry

1. INTRODUCTION

A long and hard process of industrial restructuring for Romania began in 1990, which influenced directly the quantity of industrial wastes produced in the country, their content and their possibilities of recycling. In Romania and in the other former socialist countries the inefficient management and the operation of the productive assets under the pressure of some unachievable objectives led to the interrupted functioning of the production and to the inadequate management of resources, contributing to excessive pollution levels and generating a huge volume of industrial wastes.

The sustained development of the heavy industry combined with the intensely subsidized energy and the unjustified low prices of the raw materials led to a very low efficiency of the energy use, the extensive use of the natural resources and the production of some great waste quantities. In the region where we propose the recycling of the small and pulverous wastes there are found great quantities of such wastes proceeded from the steel, energetic and mining industries.

Among the industrial branches some are responsible for producing most of the wastes: coal and ore extraction and preparation, producing the energy, the metallurgy, the chemistry, etc. For the industrial products whose fabrication implies generating of great quantities of wastes, such as: coking coal, crude iron and crude steel, the physical production had a general decreasing tendency. At these products, a tendency of production stabilization at levels of about 30% of those recorded in 1989 is found [1].

From a theoretic point of view, the industrial waste volume produced depends directly of the physical production volume (less of its value). The industrial waste quantities that are reported in various publications and studies are not correlated very well with the physic volume of the industrial production in Romania (there is not respected the discipline in financial administration and technology).

In Romania, like in other countries, the waste impact upon the environment has increased alarmingly in the latest years, their uncorresponding administration generating the contamination of the soil and of the ground water and also emissions of methane, Carbon dioxide and noxious gases, having direct effects upon the population health. The storage spaces have arrived to saturation and finding other mew ones has become a major problem (in the context of privatization).

For Romania the waste recycling represents a priority of the strategy of lasting development from the following reasons:

- the natural resources at some categories of raw materials are poor and insufficient, the industrial processing of the poor resources is made in non-competitive conditions or at the limit of competitiveness, the import of complementary raw materials can be carried out only within the limit allowed by the current account balance;
- complementing the resources by recycling the wastes can be achieved with lower costs, as a result of the significant economy of specific consumptions of energy, water, other materials, labor and of the important reduction of pollution and mining wastes in comparison with the useful substance extraction from the ores.

In the countries having a developed steel industry, the ferrous pulverous wastes are practically used in a ratio of over 90% by their reintroduction in the steel industry circuit. From the study of the specialty literature it results that for their practical application several technologies are practiced, namely: practical application by sintering, practical application by pelletizing, practical application by briquetting, practical application by reduction without any initial processing, practical application by the CARBOFER method.

2. THE STUDY

The paper presents CARBOFER obtain in the shape of micropellets, the recipes suggested for experimentations in laboratory phase following the obtained of a recyclable product, usable as well as a slag foaming agent in the process of steel made in electric furnace as well as with component in agglomeration.

The recipes for the micropellets production were thus established that the obtained micropellets to can be used-up one in two processes previously mention; therefore there must have the following characteristics:

- the recipes components granulation (for laboratory phase experimentations) must to correspond for pelletizing process (respectively granulometric structure of the palletizing charge [2,3]);
- the Fe_{total} contained must be is in the existing limits of in the used-up ores to agglomeration;
- the Carbon contained must to assure necessary of reducer element in case of using this product as slag foaming agent, and in case of using this product in agglomeration process of, must to fractionally replace an amount of coke from charge;
- contained of CaO must to assure, beside bentonite, the cementing material in order to obtaining adequate micropellets (incompressible) from behavior viewpoints to handle, transport and in the technological process.

The CARBOFER chemical composition (in micropellets shape) it's presented in table 1.

Table 1. CARBOFER (micropellets form) chemical composition

Recipe no.	Recipe components, [%]										
	SiO_2	FeO	Fe_2O_3	P_2O_5	S	C	Al_2O_3	CaO	MgO	MnO	Other oxides
R1	6,74	3,97	38,32	0,10	0,44	13,94	3,53	20,98	1,14	1,37	9,47
R2	7,45	3,97	38,34	0,10	0,44	14,92	3,65	19,10	1,13	1,36	9,53
R3	9,01	3,83	32,68	0,09	0,47	19,19	4,06	18,38	1,19	1,16	9,93
R4	8,45	4,11	34,94	0,10	0,49	17,59	4,06	17,54	1,20	1,19	10,34
R5	8,15	4,11	40,10	0,10	0,44	14,92	3,76	16,25	1,11	1,37	9,68
R6	8,37	4,19	36,38	0,10	0,48	18,39	3,98	15,53	1,15	1,19	10,24
R7	7,80	4,34	34,19	0,09	0,50	21,69	4,00	14,68	1,16	1,04	10,51
R8	7,89	4,28	33,60	0,09	0,51	22,84	4,08	13,81	1,17	1,07	10,66
R9	8,03	4,41	33,25	0,09	0,53	21,24	4,21	14,93	1,22	1,04	11,04
R10	8,03	4,59	36,79	0,09	0,53	20,26	4,20	12,05	1,19	1,14	11,14

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After micropelletizing process, for each charge was determinates the following characteristics:

- the micropellets bulk weight, wet and dried state [kg/dm3];
- the micropellets humidity, [%];
- the micropellets, raw state distribution on granulometric classes.

The results are presented in table 2.

Table 2. The main characteristics of micropellets

Recipe no.	Recipe components, [%]				Humi-dity, [%]	Bulk weight, [kg/dm3]		Granulometric classes, [mm]							
								>5 + 5÷3	>5	5÷3	3÷2	2÷1	<1	3÷1	3÷1 + <1
	Fe	CaO	C	Al_2O_3		wed	dried	Granulometric analysis, [%]							
1	29,91	20,98	13,94	3,53	3,96	1,26	1,21	73	27	46	15,5	11	0,5	26,5	27
2	29,93	19,1	14,92	3,65	4,96	1,21	1,15	61	9,5	51,5	22,1	15,2	1,7	37,3	39
3	25,86	18,38	19,19	4,06	2,44	1,23	1,2	15	6,5	8,5	10,5	73,5	1	84	85
4	27,66	17,54	17,59	4,06	4,9	1,02	0,97	17	5	12	18	63,5	1,5	81,5	83
5	31,27	16,25	14,92	3,76	3,94	1,27	1,22	38	6	32	18,5	30,5	13	49	62
6	28,73	15,53	18,39	3,98	3,67	1,09	1,05	20,5	2	18,5	39	38	2,5	77	79,5
7	27,73	14,68	21,69	4,00	3,45	1,16	1,12	76,5	63,5	13	9,5	12	2	21,5	23,5
8	26,85	13,81	22,84	4,08	4,39	1,14	1,09	11,5	1,5	10	22,5	62,5	3,5	85	88,5
9	26,71	14,93	21,24	4,21	4,84	1,24	1,18	49,5	21,5	28	22,5	17,5	10,5	40	50,5
10	29,32	12,05	20,26	4,2	2,86	1,07	1,02	8,5	1	7,5	22	41	28,5	63	91,5

3. ANALISES, DISCUTIONS, APPROACHES, INTERPRETATIONS

In figure 1 its presented appearances from palletizing process (with a laboratory dish pelletizing installation) and the obtained micropellets, base on micropellets CARBOFER technological flux.

Figure 1. Aspects from CARBOFER technological process

From viewpoint of the three main components: Fe, C, Ca, we have determinate that is covered the whole variation interspaces (area), what demonstrates the method flexibility, through the possibility of choose which recipes can contain one or many pulverous residues, dependency of the enforced chemical composition for recycling the obtained products (steelwork or agglomeration process), as the amount of residues generate in currently way on a certain distance, as well as depending on the amount of pulverous residues (inclusively small once) stored in ponds (placed around of the unit which generates the pulverous residues).

4. CONCLUSIONS

From the results analysis, we considered as the optimum recipes, from viewpoint of granulometric composition (that must to satisfy the condition of uniformity and prevalent in

1-3mm limits - granulation recommended as much in the steelwork process as slag foaming agent as well in agglomeration process), the recipes no. R3, R4, R6, R8.

Analyzing the results obtaining in the wake of our experimentations, is recommended the CARBOFER utilization as slag foaming agent and used at the electric furnaces, no influencing the steel and slag chemical composition.

Also, by utilizing CARBOFER, we obtained economic and ecological effects, through the rendition busy surfaces with these residues to the natural frame.

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