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STUDIES REGARDING THE RECOVERY POSSIBILITIES OF DEMOLITION WASTE

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Abstract

The study presents the quantity and quality of demolition waste coming from demolition sites in Bucharest. Analyzes of waste were made in order to explore the possibilities of reusing them as components of building materials . It is shown that a large amount of waste from building demolition is a reusable material. Basic oxides of calcium and magnesium in waste can adversely impact soil if deposited directly for a long time, by changing the soil pH and by diluting humus . For a better evaluation of the waste samples, the carbonate concentration was studied. Demolition waste have a large quantity of inorganic components, if the waste is deposited at the limit of the town, it can affect the productive soil for any type of crop by reducing soil fertility. Results demonstrate that the recycling of demolition waste is useful for the construction industry.

Key words*: demolition, waste, recycling, carbonate.*

INTRODUCTION

Although massive demolitions were halted for nearly a decade, demolition waste from landfills today are stored in Glina, Vidra and Giulesti. If in the last two areas, predominantly inorganic waste exists, in Glina they are mixed with organic mass.
Besides the aforementioned areas, waste quantities appear in the order of several tons scattered on vacant sites, this habit leave a trace in unsupervised places of the capital.

MATERIALS AND METHODS

In order to characterize the demolition waste, samples from various places were analysed.
The granulometric analyses of the samples have been done using a Siemens jigger apparatus.
The oxide compositions of the samples, has been determined by spectroscopic analysis, while the CO_2 concentration was determined with the gas chromatograph apparatus.
Also the calcinations loss was determined using specific thermal processing equipment.

RESULTS AND DISCUSSIONS

In Table 1 are presented the main collectors and main materials from of demolition waste in Bucharest.

Table 1 Deposits of demolition material in Bucharest

Place	Quantities (m^3)	Materials	%	Granularity (mm)
Glina	~500000	Concrete pieces	10	>50
		Broken bricks	5	10-50
		Organic waste	40	<10
		Dust, moluz	45	
Giulesti	~300000	Concrete pieces	15	>50
		Broken bricks	30	10-50
		Dust, moluz	55	<10
Vidra	~100000	Concrete pieces	5	>5
		Broken bricks	10	10-50
		Dust, moluz	85	<10

Table 2. Analysis of oxide materials.

Components	Area %		
	Glina	Giulesti	Vidra
Calcination loss	32,3	19,9	10,5
SiO_2	34,8	38,1	43,7
CaO	16,3	19,8	22,4
MgO	2,1	27	28
Fe_2O_3	9,1	16	15
Al_2O_3	5,4	7,5	6,9

Table 3. Analysis of CO_2 concentration.

Components	Units	Area		
		Glina	Giulesti	Vidra
CO_2	%	14,1	16,3	20,6

Table 4. Analysis for the obtained material after the grinding process.

Granularity (mm)	Efficiency %	
	Simple	Cumulative
0-3	30,5	30,5
3-5	30,4	60,9
5-10	16,2	77,1
10-20	11,9	89,0
20-30	11,0	100,0

Table 5. Calcination loss.

Granulometric sort (mm)	Calcination loss (%)
integral	19,9
0-3	61,4
3-5	13,1
5-10	8,4
10-20	7,5
20-30	7,3

From the oxide analysis of the waste sample in table 2, it is observed that the waste can be considered generally a mixture containing approx. 30% sand, 10-15% and 5-10% CaCO3, calcium and magnesium oxides.

The carbon was considered interesting for future use. CO_2 concentration results are presented in Table 3.

Clay content in waste is estimated approx. 25-30%. It is reported that the existence of waste in ordinary soils can affect with a basic pH and by dilution with inert humus the soil.

To observe the distribution of humus and usable material in demolition waste, a sample of 100 kg material with the size of 0-100 mm was milled under 30mm. Size analysis of the resulting material is presented in Table 4.

Research shows that 70% of the material can be used in construction, calcination loss analysis was done for the material after the grinding process,the results are presented in Table 5.

CONCLUSIONS

In Bucharest there are more than 200,000 m^3 of demolition waste due to new construction, and the actual work of construction and transformation.

- Demolition waste can contaminate the soil with their pH and by introducing inert material in the soil.

Demolition waste is produced continuously, that is why it is necessary to question the reuse and disposal.

- The results conducted in this paper show that the sorting and grinding of large material produces a 70% recyclable inorganic material.

Result of sorting waste material containing 30% sand, 10-15% $CaCO_3$, 5-10% calcium oxide and magnesium, 10-15% clay.

The material can be used, based on calculations, in mortar, mixed with cement binder.

It's economical to use such kind of materials, because sand transport becomes more expensive and the construction industry in Bucharest require increasing amounts of such materials.

Prefabricated industry and temporary buildings can benefit from these materials.

The waste resulting from the demolition can be used to manufacture insulating walls.

REFERENCES

***, Analitical Methods, Academic Press, 1978.

Barca F., Rev.Chim., 1975, 26 (10), p. 853-858.

Barca F., Georgescu I.I., Science and Technology of Environmental Protection, 1993, I, p. 24-28.

Coelho A., Brito J., Influence of construction and demolition waste management on the environmental impact of buildings, Waste Management, Volume 32, Issue 3, March 2012, p. 532-541.

Leiva C., Guzmán J., Marrero M., Arenas C., Recycled blocks with improved sound and fire insulation containing construction and demolition waste, Waste Management, Volume 33, Issue 3, March 2013, p. 663-671.

Achillas C, Vlachokostas C., Moussiopoulos N., Papaioannou I., A web-based Decision Support System for the optimal management of construction and demolition waste, Waste Management, Volume 31, Issue 12, December 2011, p. 2497-2502.