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Effective Ways To Use Domestic Industrial Waste As Secondary Raw Materials

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Abstract: *In the article "Uzmetkobinat" JSC, which is the heavy industry of our republic alco with the extensive use of man-made waste separated from the production processes of JCC "UzAutoMotors" as secondary raw materials, it is effective in obtaining anticorrosion coating necessary in construction, chemical industry, communal works, various fields of the oil and gas industry. Ways of using methods, researching technologies, providing analysis are proposed.*

As you know, in the Republic of Uzbekistan, among the metallurgical plants of JSC "Uzmetkombinat" Navoi Mining and Metallurgical Combine (NMMC) and "Almalyk Mining and Metallurgical Combine (AMMC)" are distinguished by the fact that they specialize in obtaining finished products from it by processing secondary ferrous metals. In the case of using the method of re-firing of secondary metals, it is considered that electric arc steelmaking furnaces perform the main task in the process of melting secondary metals, and the formation of waste dust from the process occurs.It goes from dissolving 1 ton of raw materials to leaving when 30 kg of dust is separated. Another aspect of the development is that when the gas purification coefficient in production is 90%, raw dust is separated using dust and gas purification systems, and 65,000 tons of dust are obtained annually. At the maximum level, discharges and dust occur during the ventilation of the electric arc in the bath and the oxygen bath. On the other hand, a small amount of dust is formed during the period when it dissolves in a clean and large-sized charge. And the minimum is reached during the period when the norm is reached. Metallurgical dust belongs to the class of inorganic materials, the composition of which will depend on the use of materials in which steel is dissolved. The intensity, content and properties of dust-repellent emissions will depend on the design dimensions and power of the furnaces, the advantages of energy-technological modes of their operation, the availability of vacuum-absorbing equipment. The elemental composition of the waste dust is presented in Table 1 as follows.

Table 1

Component	Weight, %	Component	Weight, %	Component	Weight, %
Zn	21-43	Cu	0,08-4	F	0,02-8
Fe	10-45	Cd	0,02-0,18	V	0,01-0,09
Pb	0,4-17	Al	0,3-3	S	0,1-3
SiO_2	0,6-6,1	Cl	0,8-4	C	0,4-3,3

In addition to studying the composition of the dust element, our analysis of its phase composition is also considered appropriate. Because we see that there are

differences between the composition of waste elements compared to the phase composition. Table 2 shows the phase composition.

Table 2

№	Name of phases	Quantity, %
1.	Magnet (Fe_3O_4)	50,0
2.	Zincite (ZnO)	18,7
3.	Laurionite (PbCl (OH))	1,7
4.	Silicon оксиди (SiO_2)	13,2
5.	Enstatite ((Mg, Fe) Si_2O_6)	16,0

We can classify dust into 3 groups from the point of view of dispersion during the disposal of waste from the metallurgical industry:

- visible dust (size greater than 10 μm);
- microscopic dust (size from 0.25 μm to 10 μm.up to);
- ultramicroscopic dust (size smaller than 0.25 μm).

The dust of metallurgical waste in the bulk consists of particles with a diameter of less than 3 microns. The degree of dust dispersion is considered an important aspect in obtaining an anticorrosive primer coating. One of the main reasons for this is the high adhesive property when it is converted into a product. If 60-70% of the dust consists of particles with a diameter of less than 10 microns, then it has its own viscosity property. This is one of the options concerning the type of paintwork and the technology of obtaining an anticorrosive primer material. One of the important factors of the phase composition in Table 2 above is the fact that when applying a large amount of metal oxides in the composition to the surface of the anticorrosive primer antimony coating, in order to avoid corrosion, the surface of the surface must dry out within a certain period of time, forming a multilayer surface and a homogeneous opaque coating. Due to this, it is observed that when obtaining an anticorrosive primer coating, metallurgical dust, as a raw material of red iron oxide pigment, its substitute analogue serves as a secondary raw material and allows to improve adhesion to the surface, partially covering the surface of the housing.

Another waste that we have is the collection of sludge in the phosphating processes associated with automotive production in our republic, which amounts to 120-140 tons per year. These anticorrosive treatment wastes serve as a suitable material for obtaining a primer. Therefore, there is a need to study and analyze a substance that is necessary in the environment and suitable for use as a source of secondary raw materials. We can see the following result when we study the elemental porosity of the phosphating suspension. The results are presented in table 3.

table 3

№	1	2	3	4	5	6	7	8	9	10
Naming components	Si	Al	Ca	Na	K	Fe	Mg	P	Ba	Sr
Weight	0,6	0,03	0,2	8	0,3	4	0,05	25	-	-

quantity, %										
№	11	12	13	14	15	16	17	18	19	20
Naming components	B	Mn	V	Ti	Cr	Pt	Pd	Os	Ir	Au
Weight quantity, %	-	0,6	-	0,02	0,02	-	-	-	-	-
№	21	22	23	24	25	26	27	28	29	30
Naming components	Ag	Cu	Pb	Zn	As	Bi	Ni	Co	Sb	Hg
Weight quantity, %	-	-	0,08	6	-	-	0,08	-	-	-
№	31	32	33	34	35	36	37	38	39	40
Naming components	Mo	W	Sn	Be	Ta	Nb	Li	Ce	La	Y
Weight quantity, %	-	-	0,05	-	-	-	-	-	-	-
№	41	42	43	44	45	46	47	48	49	50
Naming components	Cd	Ib	Zr	Hf	Re	Sc	Te	Cd	In	Tl
Weight quantity, %	-	-	-	-	-	-	-	-	-	-

From Table 3, we see that within the elements, the phosphorus element accounts for 25%, and the zinc element - 6%. These elements act as additional fillers, and not as the main raw material for the anticorrosive coating of the paint type, while the phosphorus element, when added to our material, leads to an increase in the properties of the material to restrain its appearance in the night vacuum (reflector), the possibility of giving a glossy, polished shade and low flammability, zinc metal oxide, on the other hand, as a result of its addition to iron oxide, which is the main raw material, allows you to provide a positive effect when fully covering the body surface parts by increasing the amount of metal oxides.

To do this, it will be desirable for us to get acquainted with the physico-chemical nature of sludge waste. Table 4 shows the parameters of the phosphating suspension.

table 4

Name	First appearance	Second appearance
Appearance	Different mass	Sprinkled appearance
Color	From light yellow	Up to dark yellow
The amount of moisture and volatile substances	4-6%	4-6%
Density, g/cm^3	1-1,1	1-1,1
Solubility in water	50-60%	50-60%
pH status	5-6	5-6

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In ethanol and other solvents	80-90%	80-90%

In accordance with the physico-chemical nature of the objects presented in the table, the phosphating suspension turns into a fine particle by processing it, since its solubility in water and organic solutions is active, and its appearance has a scattering form. In addition, these slag wastes can be used to obtain an anticorrosive coating. The most important thing is to cover black and non-ferrous metal surfaces with a protective coating against phosphating of the metal body of a car in the automotive industry. 6% of zinc contained in slag waste, which is characteristic of the process, is a sign that the Surkov anticorrosive coating we receive is a composition that protects the corrosion properties of Cora metals. The focus of this phosphating process on the processing of slag waste and their use in the desired direction leads to the elimination of man-made waste generated in the automotive industry network, and, thanks to this, the improvement of environmental conditions and a positive attitude to environmental safety problems in the territory.

At the painting stage of the processes belonging to this manufacturing enterprise of the automotive industry, the waste of the separated suspension amounts to 240-280 tons per year to the plant itself in Asaka. The physico-chemical properties of this waste suspension are shown in table 5 below.

table 5

Indicator	First appearance	Second appearance
Appearance	Pasty mass	Solid elastic mass
Color	From light gray	Up to dark gray
Humidity level	15 – 20 %	4 – 6 %
Density, g/cm^3	1,5 – 1,6	0,99 – 1
Solubility in water	1	0
Solubility in acetone	7 – 8 %	1 %
pH status	6 – 7	6 – 7

The property of the suspension of waste generated during the dyeing process may eventually burn out. In this case, at a time when the cuttings waste has just left the process, there is a soft pasty, a high level of humidity, and later, over time, there is a change in shade, appearance, moisture content. When we saw it according to the element in our next analysis, it looked like this.

Table 6 shows the results of the analysis of the dye suspension element formed during the dyeing process.

table 6

№	Name of sample	1	2	3	4	5	6	7	8	9
		Si	Al	Ca	Na	K	Fe	Mg	P	Ba

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		Mass quantity, %								
1	№1	0,6	0,4	0,003	<0,01	<0,01	0,3	0,06	0,4	-
2	№2	0,04	0,03	0,2	8	0,3	4	0,05	25	-
№	Name of sample	10	11	12	13	14	15	16	17	18
		Sr	B	Mn	V	Ti	Cr	Pt	Pd	Os
		Mass quantity, %								
1	№1	-	-	0,008	-	40	0,003	-	-	-
2	№2	-	-	0,6	-	0,02	0,02	-	-	-
№	Name of sample	19	20	21	22	23	24	25	26	27
		Ir	Au	Ag	Cu	Pb	Zn	As	Bi	Ni
		Mass quantity, %								
1	№1	-	-	-	0,006	-	-	-	-	-
2	№2	-	-	-	-	0,08	6	-	-	0,08
№	Name of sample	28	29	30	31	32	33	34	35	36
		Co	Sb	Hg	Mo	W	Sn	Be	Ta	Nb
		Mass quantity, %								
1	№1	-	-	-	-	-	0,006	-	-	-
2	№2	-	-	-	-	-	0,005	-	-	-
№	Name of sample	37	38	39	40	41	42	43	44	45
		Li	Ce	La	Y	Gd	Ib	Zr	Hf	Re
		Mass quantity, %								
1	№1	-	-	-	-	-	-	-	-	-
2	№2	-	-	-	-	-	-	-	-	-
№	Name of sample	46	47	48	49	50	51	52	53	54
		Se	Te	Cd	In	Tl	Ga	Ge	U	Th
		Mass quantity, %								
1	№1	-	-	-	-	-	-	-	-	-
2	№2	-	-	-	-	-	-	-	-	-

If we look at our table 6, we can see that in our table we list the types related to metals according to 54 chemical elements. This is due to the fact that the Ti element in it has a mass fraction of 40%, while the varnish and the associated primer material are obtained. The reason is that the main raw material part of our paint and varnish materials is primary titanium oxide. Based on this, it would be advisable for us in the future to work on obtaining an anticorrosive antimony coating of paint and varnish type, using it as a secondary raw material from titanium oxide in the composition of this product.

Our republic needs such industries as construction, oil and gas, chemical industry, economic industry and others. These wastes serve as secondary raw materials replacing the primary raw materials for anticorrosive coatings, namely, for corrosion protection of materials necessary for these industries: metal products, foundations, structures, equipment, pipelines and other parts.

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