

THE GALVANIC PRODUCTIONS WASTE WATERS AND SLUDGES PROCESSING WITH THE HEAVY METALS IONS EXTRACTION

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The galvanic sludges utilization challenge is, in general, one of the most actual and the most urgent ecological challenges of the industrial enterprises, having had just in its galvanic processes' technological repeat cycle. They are being presented by themselves the blended saline, the hydroxides, the carbonates, the heavy metals sulphides, having formed during the sewage cleaning.

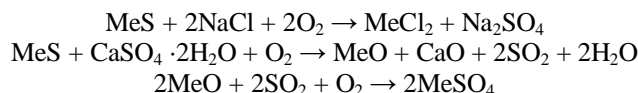
The heavy metals are being occupied the first place by the stress – factors scale (e.g. the Courteu – Dubinin indices), having characterized the pollutant's danger. The heavy metals ions are quite able to be accumulated just in the human organism and also to be brought on the most serious damages in his vital functions activity, having entered in the human organism together with the water and the food products. The metals ions are negatively being made their influence upon the organoleptic water characteristics.

As a result of the heavy metals ions toxicity, their disposal is not quite being allowed at the solid domestic waste refuse dumps, and the enterprises are being made to be stored them at their own territory, at the same time, having formed, ipso facto, the secondary pollution sources of the environment.

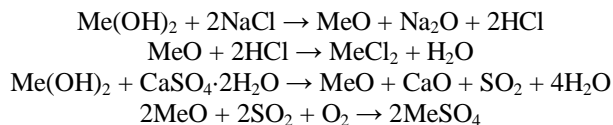
Besides, only up to 50% the colored metals ions quantity, having taken their part just in the galvanic process, are being left the electrolyte solution and, at the same time, are being accumulated on the details. The rest ones are being left just in the baths, in the electrolyte, or in the form of the laid – down the sludge on its bottom. In this connection, the valuable components extraction just from the galvanic production waste products must make up the considerable profit.

The heavy metals ions leaching, by means of the sulphuric acid is the one of the galvanic sludges processing directions.

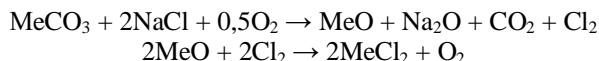
For the sulphides:



For the hydroxides:



For the carbonates:



The paper's authors have already developed the manufacturing scheme of the galvanic production waste products deactivation, by means of the simultaneous extraction the heavy metals ions just from the sludges and the waste sewage.

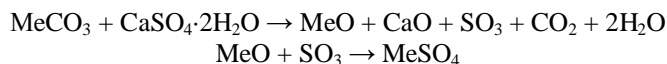
The galvanic workshop sludge, having contained mg/kg, has been served the investigations object:

Zn – 46625; Ni – 1433; Cu – 12750; Fe – 20100; Ca – 115500; the sand, the magnesium carbonates, the sodium carbonates – 767811 and the waste water of the same workshop, having contained the same and identical components. The waste water hydrogen index has been made up pH=2,5.

The main aim of these investigations has been consisted in the deleterious effect lowering upon the galvanic production environmental toxic waste, in the form of the sludges and having been formed waste sewage, owing to the heavy metals – such as Zn, Ni, Cu, Fe final extraction just from them.

It has been developed the manufacturing scheme, having included the galvanic sludge blending with the special additions, having contained the chloride – or the sulphate – the ions, in the ratio Cl^- or $(\text{SO}_4^{2-}) : \sum \text{Me}^{n+}$ = not less 1:1, the received mixture mechano – chemical activation, by means of the following grinding just in the ball grinder of the dry grinding up to 0,5 – 5 mkm size, the following thermal treatment just in the muffle furnace, having the 550 – 600 °C temperature, the received sinter leaching of the proper galvanic production waste water at $\text{pH} \leq 3$, the solution separation just from the settled sludge, by means of the filtration, and the metals extraction just from the received solution, by means of the electro – flotation at the increased pH = 8 – 10 for the assigned object achievement.

The sludge mechano-chemical activation with the chloride – or the sulphate – the ions is being intensified the following the water – soluble many – metallic bonding formation at the heating up to the 550 – 600 °C temperature, in the form of the chlorides and the sulphates. So, the hypothetical chemism of the sulphides, the hydroxides, and the metals carbonates transition proceeding processes just into the water – soluble sulphates and the chlorides has been presented by the following scheme:



The metals ions are being transformed into the aqueous solution, at the leaching by the acid sewage water of the similar composition proper production, ipso facto, having increased the analogous metals concentration, having contained just in the waste water.

At the leaching, having formed the Na_2O and CaO oxides at the burning, are being transformed into the hydroxides, having, slightly, lowered the leaching solution acidity, that is able to be promoted to the iron saline reverse transformation just into the hydroxides, as the iron hydration process is being taken its place, having $\text{pH} \geq 3$. Therefore, it is necessary the solution acidity correction just in the leaching process.

So, the leaching is being increased with the following temperature rise, and, in this connection, it is efficiently this process to be carried out at the $40 - 50^\circ\text{C}$ temperature during in the range of 4 – 6 hours.

The solution has been separated just from the settled sludge by the filtering, and it has been placed into the electro – flotation chamber with it's the 1 l. volume. The flotation process has already been made at the 50 ma/cm^2 current density during at the increased $\text{pH} = 8 - 10$. Thus, the pH solution rise has been made, by means of the caustic soda. The PAV of the anionic type – the sodium alkyl – benzol – sulfonate (e.g. sulfonole), in the quantity of 5 mg/l and the potassium xanthate, in the quantity of 3 mg per 100 mg the metals ions just in the solution has been used, as the foaming agent and the collector at the flotation metals extraction.

The electro – flotation metals ions extraction method use just from the solutions has been conditioned by its efficiency. Having changed the process electrical parameters, it is quite possible to provide the air bubbles optimum dispersion, and, at the same time, not having destroyed the foam layer. In addition to the electrode processes, these volumetric chemical reactions are being proceeded just in the electro – flotation device, which are being resulted in the such phenomena, as the Nature changing and the floto – concentrate solubility, the settled sludge dissolution or the following its formation, the complexing agents destruction, that is being promoted to the process quality rise.

So, the received froth concentrate has been dried out and, it has been subjected to the following burning at the 600°C temperature with the final receiving metallic powder.

Thus, the suggested simultaneous waste sewage waters and the galvanic production sludges deactivation technology will be permitted to lower the toxic pollutants and the substances influence upon the environment and also to receive the valuable production, in the form of the metallic powder, which is quite able to be used just in the industrial targets.

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