The Neutralization of Water Polution

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One of the biggest sources of pollution land and water are industrial waste waters.
At section of zinc industry in complex Trepca during the process of zink production acquire(are gained or obtained) wastewater where their negative impact is wider extent of contamination of land with which it comes in contact and in this case comes to the accumulation ions of heavy metals, surface-water and then mixing with groundwater and pollution.
Directly with vulnerable is Sitnica river, in which contaminated water flows from the industrial unit for the production of Zn, which flows into the Ibar river, which still flows into the Morava river in Serbia, thus presents a problem internationally.
The objective of the paper is concerned with the characteristics of industrial wastewater from the section of zinc in Trepca complex and their impact on water pollution around.
Are made quantitative and qualitative analyzes of samples of polluted water before and after the production process and is found high content of ions of heavy metals such as: Pb, Zn, Cu, Fe, Cd, Bi, Ni, Co, Sb , Sn, etc., and which exceed the values of MLD,provided by international legislative rules.
Neutralization is made of industrial wastewater based on the pH value and concluded that the water is rich belongs to the category of IV water according to legal regulations for water.

Keywords: Neutralization, wastewater, contamination

Entry

Natural water is clean and basic and indispensable element for human life, plant and animals, so is the principle that all the inhabitants of the planet to care for the exploitation and protection of his right.
Population growth and rapid development of society in terms of technological industry and has lead to enormous exploitation of water resources as well as to excessive pollution of water (surface-and groundwater).
In recent decades, as locally and internationaly importance that special attention is paid to cleaning of industrial wastewater, in order to improve the level of water pollution.
A special emphasis is paid of: equipment, automation for the processing of wastewater with dosing reagent then high frequency of cleaning of metal ions with slaked limes, eligibility and elements present in the molten.
Water that is used in technological processes for the production of metal is actually contaminated water. The degree of contamination depends on the amount of waste that water contains.

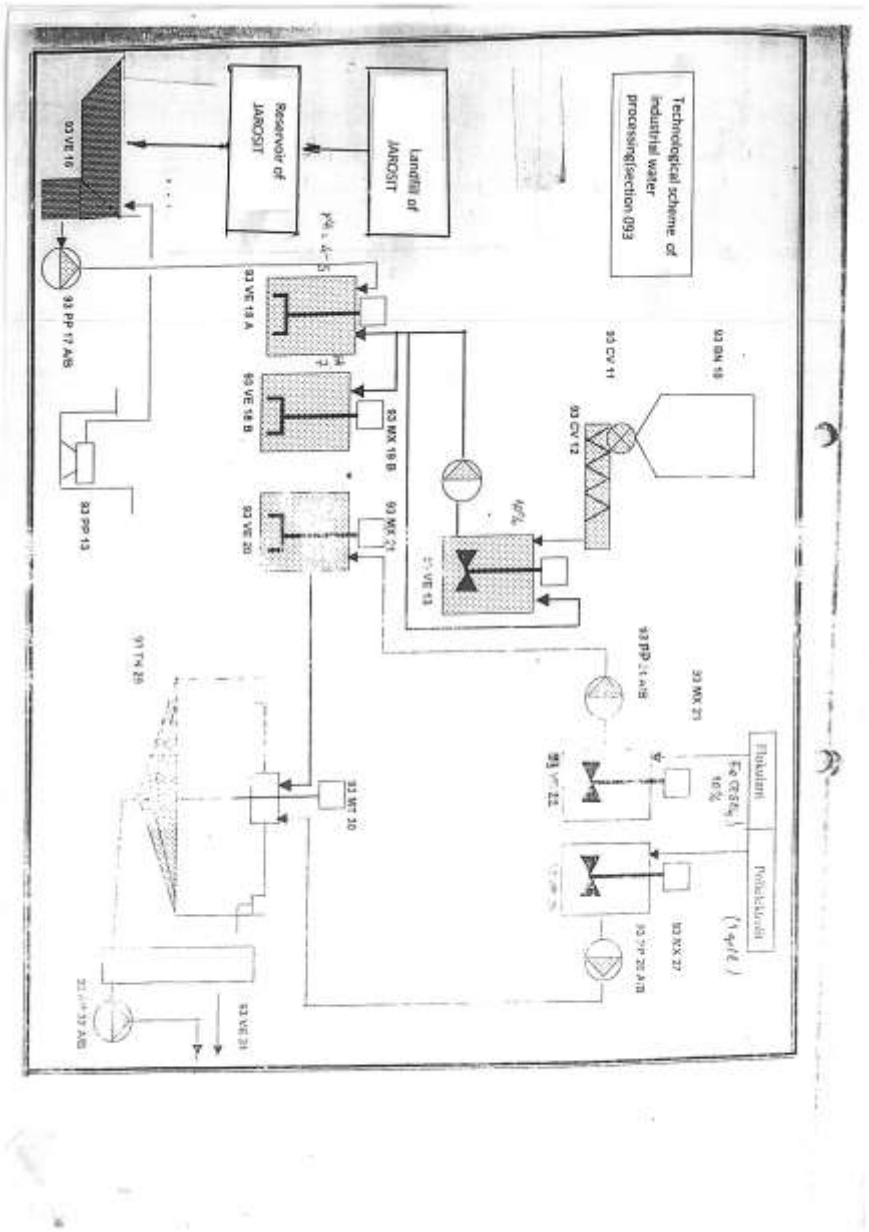
While matter pollutants coming from industrial units, then it comes to industrial wastewater, while if they come from more than urban households having then it comes to municipal wastewater. So that these waters back in kind and used again they must undergo purification process, which is performed through mechanical methods, chemical and biological.
Chemical methods for purification of water mean water purification process, which is based on chemical reactions and physico-chemical phenomena. Chemical process for the purification of water is very costly, but for cleaning the impurities present in the water some chemical process is no alternative.
As a base chemical cleaning process of polluted water from some solvable matteries is: With chemical precipitation with ion exchange,gas blow oxidation and adsorption.
Industrial wastewater resulting from the different sections of the technological processes, but as their common characteristic is the high degree of toxicity receptors.The toxicity of these waste water is expressed by the degree of acidity and alkaline in the presence of a number of heavy metals, phenols, mineral oils and detergents, and in

Technological process for the processing of industrial waste water

Equipment for processing of industrial wastewater with neutralization process are intended for: receiving, neutralization and water purification, as well as filtering waste from contaminated water.
Liquid waste which come from different sections collected in the basin 93 VE 93 16. One of pumps PP 18 A / B made pumping in tank for neutralization in 93 VE 18 A / B that are located at cascade mood Slaked lime obtained from the processing of qiuck lime, which is transported through track and is stored in the bunker 93 BN 10. And slaked lime through ekstraktor 93 CV 11, with the help of pneumatic valve , drawn and with spiral transporters 93 CV 12 forwards so booked for the preparation milk lime, where the reservoir is equipped with agitator 93 VE 13.
Measurer level, through the contactor with the upper and lower part, made the opening for the supply of lime and water when the lower level is reached and interrupt when the upper level is reached.
Preparing thus becomes the lime with 10% Ca (OH)2 . Specific weight of hydrated lime optimal adjusted based on experience.
The injection of lime made in two reservoirs, so that neutralization is done in stages, at pH 4-5 in the reservoir 93 VE 18 and at pH= 7 in the reservoir 93 VE 18 B.
The third reservoir for flotation 93 V 20 also is placed in cascade mode compared with the reservoir93VE18A/B.
Reagent for flokulim, FeClSO4, preparation mechanically with 10% to rezervoir 93 VE 22 andwith the aid pump for dosing PP 93 24 A / B, the flow of which is regulated mechanically and sent to the reservoir 93 VE 20.
In cases where the pH value measured in the reservoir 93 V 18 B is low, then through a tube contaminated water turn in the basin 93 VE 16 through automatic valve which is located at the outlet of the reservoir 93 VE 20.
The solution whose is added flocculant(layer) through gravity sent to precipitation 93 TN 29. We added at supplier cylinder of precipitator polyelectrolyte which serves as a catalyst for precepitation.
This polyelectrolyte preparation mechanically by 0.1% in the reservoir 93 VE 26 and injected through a dosing pumpe PP 93 28 A/B, where the flow is regulated mechanically.
The clean neutralized solution flow from precipitator with gravitation and goes to the river.

Precipitate collected at the end of precipator passes through the reservoir to homogenise 93 VE 31, and with the help of a membrane pumpe PP 93 32 A / B pumped into the filtration equipment. Obtained precipitate undergoing processing, while filtrate goes into the river.

In Fig.1. The following will be presented technological scheme of industrial waste water processing (section 093).



Experimental Part

The degree of efficiency during precipitation of heavy metals depending on the pH value of industrial waste water processing of zinc metallurgy

Practically is confirmed that the process of cleaning wastewater with slaked lime in the form suspension is economical. The reason of process to processing with slaked lime based in the fact that most metal ions precipited in the form of hydroxides, where the rate of precipitation, where them precipitation scale depends how like the homogenity, concentration of metal ions and the amount of dosed of lime that depends on the pH value.The process of neutralization of acidic wastewater is carried out in pH = 7.5-8.5, which in this case comes to heavy metal precipitation.
As a result of the neutralization process and hydrolysis acidic wastewater that comes to precipitation of heavy metals in the form of hydroxide, but as a result of the presence of calcium carbonate comes even to the formation of carbonate. With the introduction of chemical reagent made destabilization of colloids as a result of this we have the process of coagulation. Giving the reagents, which ions react with colloids comes to the elimination of electrostatic forces in colloids.

As a result of the coagulation process and the formation of more floske, to which precipitate. With this reach the precipitation of heavy metals from wastewater, regardless of pH values for some oxides, such as are given in tab.1.following: :

Tab.1.precipitationof pH values of some heavy metal hydroxides are as follows:

Hydroxide	pH value
$Pb(OH)_2$	6
$Zn(OH)_2$	6
$Mg(OH)_2$	11
AgOH	9
$Hg(OH)_2$	7-8
$Ca(OH)_2$	7-8
$Cu(OH)_2$	6
$Cd(OH)_2$	7-8
$Zr(OH)_2$	4
$Fe(OH)_3$	2-3
$Ge(OH)_4$	2-3
$Ti(OH)_3$	4
$Ni(OH)_2$	7-8
$Pb(OH)_4$	7-8
$Bi(OH)_3$	6
$Al(OH)_3$	4

Also process wastewater processing is done with the help of flocculant and polyelectrolyte.
FeClSO4 is used as an electrolyte, which serves to create greater floske. Thus the reaction between H2SO and Ca (OH)2 occurs the formation of CaSO4, which is characterized by product solubility lower, which runs the precipitate and detached attracts the heavy metals in the form of hydroxide, as follow reactions:

$$ZnSO4 + CaSO4 + xH2O = Zn(OH)2 + CaSO4 + yH2O$$
$$CdSO4 + CaSO4 + xH2O = Cd(OH)2 + CaSO4 + yH2O$$
$$2PbCO3 + Pb(OH)2 = 2\,Pb\,CO3 \cdot Pb(OH)2$$
$$PbSO4 + Ca(OH)2 + H2O \cdot CO2 = PbCO3 + CaSO4 + H2O$$
$$Pb^{++} + Ca(OH)2 = Pb(OH)2$$
$$H2SO4 + Ca(OH)2 + H2O = CaSO4 + H2O$$
$$CuSO4 + Ca(OH)2 = Cu(OH)2 + CaSO4$$

Chemical composition analysis

Verification scale of precipitation of heavy metals and neutralization complete with chalk erased depending on the pH is made independently of content, Pb, Zn, Cu and Cd and that both before and after cleaning the wastewater industrial.

It also has become the research content of heavy metals even in certain pH values of 9 to 10.5 in reservoirs for wastewater neutralization.

Analysis for heavy metals are carried out polarigrafike method and results are given in the table.Wastewater samples were taken every 2 hours and it shaped composite.

Tab. 2. Sample no. 1.

Sample 1 (mg /l)					
Wastewater	pH	Pb	Zn	Cu	Cd
Before cleaning	2.5	3.8	985	1.6	2.7
After cleaning	8	2.3	350	1.1	1.3
After cleaning	9	1.1	130	0.23	0.3
After cleaning	10.5	0.45	11.5	T	T
The eficasity scale of cleaning		88.15	98.83	99.99	99.99

Tab. 3.Sample nr.2.

Sample 2 (mg /l)					
Wastewater	pH	Pb	Zn	Cu	Cd
Para pastrimit Before cleaning	1.9	0.9	904	2.6	1.7
Pas pastrimit After cleaning	8	0.5	305	1.4	1.2
Pas pastrimit After cleaning	9	0.24	110	0.78	0.6
Pas pastrimit After cleaning	10.5	0.12	23.3	0.34	0.15
The eficasity scale of cleaning		86.66	97.42	86.92	91.17

Tab. 4. Sample nr.3.

Mostra 3 (mg /l)					
Wastewater	pH	Pb	Zn	Cu	Cd
Before cleaning	1.5	1.9	1250	1.34	2.7
After cleaning	8	0.4	340	0.7	0.23
After cleaning	9	0.5	85	T	T
After cleaning	10.5	0.03	9.6	T	T
The eficasity scale of cleaning		98.42	99.23	99.99	99.99

Discussion of results

Based on the results obtained reach the conclusion that:
- Precipitation as full of havy metals must be carried out in the pH values of 10.5
-For larger quantities slaked lime added to the pH increase and this increases the degree of purification, the pH of 10.5 to 12.5, because with increasing pH value, zinc passes at zincate.
-At pH values from 10.5 to 12.5 by flow 99.99% efficiency of the impurities removed heavy metals such as Zn, Cu and Cd.
-In the same pH conditions achieved clearance rate of 87% Pb deviation of Pb sçarohet the fact that the optimum pH values for the removal of Pb ranging from 8-10.5. Above these values come back up in the form of 2PbCO3 Pb (OH)2, and with this the increase of the concentration of ions present.
-For removing Cu need pH = 8, while the removal of Cd required pH value of about 9. While the limit for Pb reached by difficult.
Limits concentration of heavy metals which may precipitation in the ranges allowed, regardless processing with slaked lime, are quite variable and depend on the nature same pollution.
With the development of the reaction of Pb, Fe and Cu through processing with slaked lime, for a short time come to preceptation in the form of hydroxide, and for Zn and Cd need a longer time.
Research has proven that during the processing of industrial wastewater with slaked lime, precipitation process of heavy metals is effective for the pH value of 10.2.
This applies for Cu, Zn, Fe and Cd, while for Pb to pH values of 10.5, come to his melting with zinc and as a result of the reaction of Pb content exceeded the initial polluted water.
This shows that for determining the degree of purification of industrial wastewater should be in mind keeping the pH value in the ranges allow for an efficient precipitation to each heavy metal.

RESUME

With the process neutralization with slaked lime to achieve that the majority of metal ions preceptiation in the form of hydroxide.
The efficiency of heavy metals preceptiation depending on by pH value with milk lime, as follows: Pb = 65-83%; Zn = 93-99%; Cu = 65-83% and Cd = 95-99%, so it is within the allowed limits and after preparing enabled the issuance of industrial wastewater according to the legal rules for the protection of water.

In cases when have to deal with increased alkaline during the process of neutralization, then we have to add acid melting or an amount of water industrial waste, so that the pH value to correspondence with the conditions of the working environment, as defined according to the rules of law .
In cases when have the average values of heavy metals in industrial waste water, then needed value is pH = 10.5, while in cases when have with overload process, then needed value is pH= 12.5

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