CLEANING CONTAMINATED WATER WITH THE BIOSORBENT: OLIVE SEEED

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2. ABSTRACT

This study was conducted to investigate the effect of olive seeds powder and its ability of heavy metal absorption. Heavy metals that we used were: Chromium (**$Na_2Cr_2O_7$**), Copper (**$CuSO_4$**), Lead (**$Pb(NO_3)_2$**), Manganese (**$KMnO_4$**), from multi-component systems at different adsorbent/metal ion ratios. Different parameters such as amounts and absorption of heavy metals were evaluated. The influence of pH, contact time, temperature and the concentration of adsorbent and adsorbate were studied to optimize the conditions to be utilized on a commercial scale for the decontamination of effluents in a batch absorption technique. The optimum absorption was found to occur at contact time 16h, pH value 5.0, adsorbent dose from highest range from 99.9% for Pb (15% green olive seed powder) to lowest range to 81.6% for Cu (5% green olive seed powder). Although we didn't measured pH, it appeared that increasing the amount of olive seed powder and increasing pH in polluted water the results of heavy metal absorption increased too, till some level of amount of absorbent, when started to decrease. Nevertheless, the results showed that this way of heavy metal absorption from wastewater, with theolive seed powder, is useful, alternative method which indicated decreasing in any situation. The technique appears industrially applicable and viable.

1. INRODUCTION

Toxic heavy metal pollution of wastewater currently becomes a key environmental problem throughout the whole world. WHO also indicates that 2.1 billion people cannot access clean drinking water in their homes, while nearly 1 billion people lack access to clean drinking water at all—and of course those figures will grow as climate change alters the environment and reduces access. Heavy metals find their way into water in multiple ways. Industrial concerns cause metals to leach into the water supply, either accidentally or by actively dumping waste or even from acidic rain breaking down soils and releasing heavy metals into streams, lakes, rivers, and groundwater.

So, this was it, which we were aiming for. Having in mind that our body is 70% consisted from water, this information was very useful to start from somewhere. The initial idea that we came up to, was the desire to be able to remove toxic heavy metals from drinking water in remote locations that didn't have power and to be alternative method for already used methods, to be from some natural materials that are environmental friendly and ecological, easily findable and to be low-cost, at the same time. Making a lot of pre-researches on internet and reading a lot of articles, used sorbents for heavy metal filtration in water waste and drinking water, we wanted to be something totally different that is used till now, and literally to be our invention, and again easily find in our surrounding.

3. MATERIALS

Sorbent: **Olive seeds**

Experiment 1:

$CuSO_4$ -Copper Sulphate
$KMnO_4$ -Potassium permanganate
$Pb(NO_3)_2$ -Lead (II)Nitrate
$Na_2Cr_2O_7$ -Sodium dichromate
Sorbent: **Green** olive seeds

Experiment 2:

$CuSO_4$ -Copper Sulphate
$KMnO_4$ -Potassium permanganate
$Pb(NO_3)_2$ -Lead (II)Nitrate
$Na_2Cr_2O_7$ -Sodium dichromate
Sorbent: **Black** olive seeds

$KMnO_4$

$Na_2Cr_2O_7$

$CuSO_4$

$Pb(NO_3)_2$

4. SORBENT PREPARATION

The preparation process doesn't take a lot of time. We used a blender for the making the olive seeds powder. We divided the olive seeds into two groups: black and green olive seeds which later we used them separately as well as combined. After making the experiment we went to electromechanical faculty for in order to be professionally.

Blender

Olive Seed Powder

The experiment consisted of making samples of the polluted water in our country and pouring the previously made biosorbent: the olive seed powder, as well as ensuring they are sufficiently mixed to react.

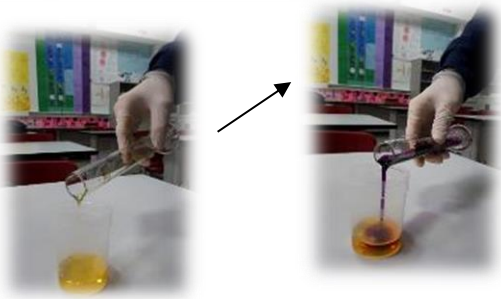
measuring

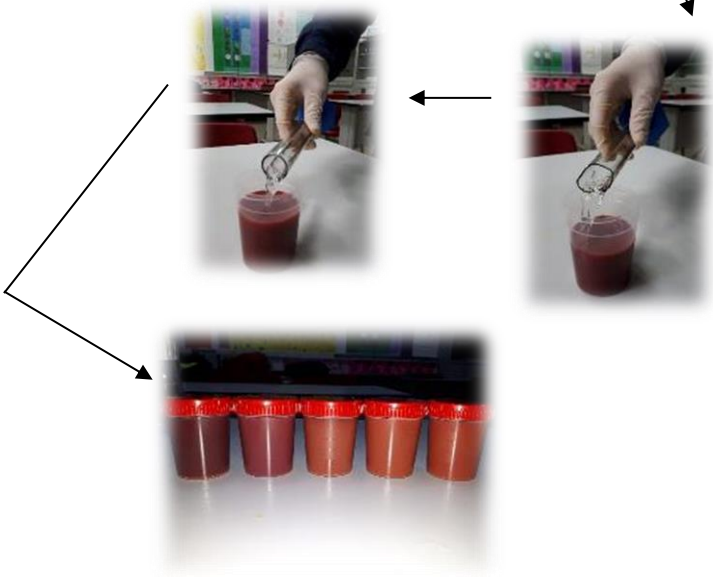
adding

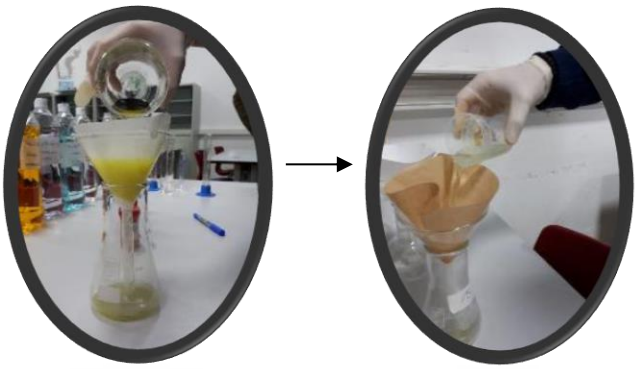
Mixing the substances

To make it more intense, and push these sorbents to give their best, we mixed all of the heavy metal solutions into one. 5 different cups, each containing 80ml of different heavy metal solutions. So, 20 ml $Na_2Cr_2O_7$ -Sodium dichromate ($Na_2Cr_2O_7$ - Sodium dichromate) , 20 ml $KMnO_4$ - Potassium permanganate , 20 ml $Pb(NO_3)_2$ -Lead (II) Nitrate and 20 ml $CuSO_4$ -Copper Sulphate.

First, we shaped a filter disc according to the glass funnel and put it on its end. We put an empty and unused cup as our filtration cup. Then, we proceeded to pour the mixed substance into the funnel with utter caution and we made sure that the liquid did not go over the limits of the filtration paper







Last, we went to the RZ Technical Control AD Skopje in order to professionally measure the final concentration of all our experimented solutions. After 2 days we got the results.

5. RESULTS:

No	Samples	Cr , ppm	Pb, ppm	Cu , ppm	Mn , ppm
1	***5% green olive seed***	1.95	1.0	70	154
2	***10% green olive seed***	3.6	0.48	47	167
3	***15% green olive seed***	1.48	0.45	46	175
4	***20% green olive seed***	1.41	0.45	45	175
5	***5% black olive seed***	1.1	0.70	52	214
6	***10% black olive seed***	1.57	0.72	50	218
7	***15% black olive seed***	1.89	0.96	59	175
8	***20% black olive seed***	1.97	1.08	66	180

Absorption of heavy metals in percentage(%) for green olive seed

	5% green olive seed	10% green olive seed	15% green olive seed	20% green olive seed
Pb	99.8	99.89	99.9	99.9
Cr	98.1	96.4	98.5	98.6
Cu	81.6	87.7	87.9	88.2

Absorption of heavy metals in percentage(%) for black olive seed

	5% black olive seed	10% black olive seed	15% black olive seed	20% black olive seed
Pb	99.83	99.83	99.8	99.7
Cr	98.9	98.4	98.1	98
Cu	86.4	86.9	84.5	82.7

As seen from the tables and chart above we can conclude that the olive seed powder managed to be most effective with 99.9% for Pb (15% green olive seed powder) to lowest range to 81.6% for Cu (5% green olive seed powder).

6.CONCLUSION

Conventional treatment technologies for removal of heavy metals from aqueous solution are not economical and generate huge quantity of toxic chemical sludge. Once the metals are recovered, the biomass material, which is biodegradable, will cause no environmental damage and may be utilized as natural soil conditioners or fertilizer. Hence, the above biomasses could be used for cleansing the environment and industrial waste water. So recycling of sorbent can be done to make the remediation process cost effective. Finally, the results suggest that sorbents that has similar physical and chemical properties of olive seed powder are valuable and highly efficient adsorbents, which can be applied for heavy metals removal in water treatment processes.