Investigation of the viability of converting a leachate from a mechanical biological treatment plant for municipal solid waste into fertilizers

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INTRODUCTION

The main environmental issue associated with the compost manufacture process is the production of a waste liquid leachate very complex in terms of composition. But, compost leachates may also be considered as a source of nutrients and can be converted to fertilizers. Physical and chemical properties were determined for a raw leachate from a mechanical biological treatment plant for municipal solid waste, to evaluate if it meets suitable requirements for using as commercial fertilizer according to the proposal of regulation of the European Parliament of 2016. So, this study intends to assess if the leachate can be used as a potential source for fertilizers. It qualitatively meets the requirements established for the composition of commercial fertilizers. Furthermore, the production costs of the leachate as a raw material are low since it is a waste effluent. Initial results showed low concentrations of some heavy metals and acceptable amounts of nutrients after concentration by batch distillation.

EXPERIMENTAL

1. Leachate samples

Samples

- ➢Original
- ➢24x
- ➢36x
- ➢45x
- ➢45x
- ➢50x
- ➢90x

2. Analysis

pH

Conductivity

Spectrophotometry

Density

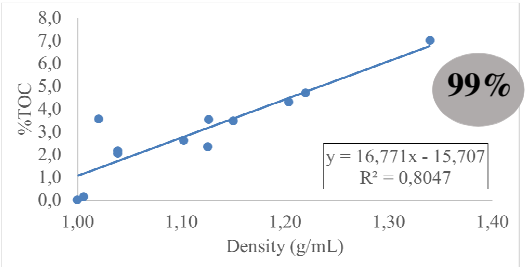
TOC

RESULTS

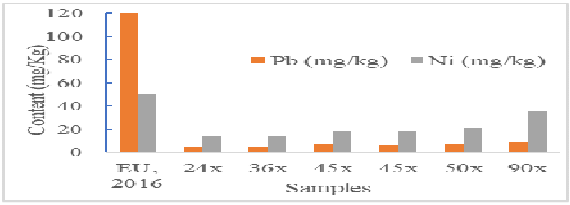
1. Chemical properties

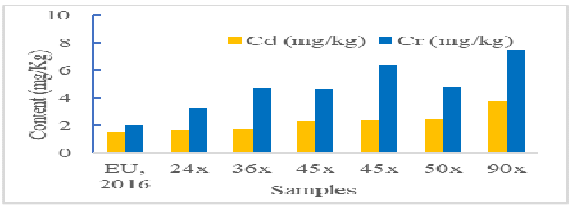
Samples	pH	Conductivity (mS/cm)	% TOC	Density (mg/L)
EU, 2016	-	-	3	-
Original	8,7	12,5	0,14	1,01
24x	11,0	124,8	3,48	1,15
36x			3,53	1,13
45x			4,69	1,22
45x			4,30	1,20
50x			3,54	1,02
90x			7,01	1,34

2. Correlation between Density and TOC



3. Heavy metals content





4. Content of nitrogen

Sample	TKN	Ammoniacal	Organic
	N (%w/w)	N (%w/w)	N (%w/w)
EU, 2016	2	-	0,5
1	0,0286	0,0227	0,0059
2	0,0245	0,0231	0,0014
3	0,0272	0,0227	0,0045

5. Concentration of P_2O_5

Sample	Absorbance	Concentration (% m/m)
EU, 2016	-	2
24x	0,144	0,036
50x	0,345	0,039

CONCLUSIONS

- ✓ The concentrated leachate has potential to be used as fertilizer after simple processing.
- ✓ It displays high values of pH and concentration of total organic carbon (TOC) and low levels of heavy metals. Few adjustments must be made, especially in pH and heavy metals concentration.
- ✓ Nitrogen and phosphorus presented low concentrations, mainly due to the composition of the sample used.
- ✓ The potential use of these wastes as fertilizers is still worthy of further studying because it represents high value-added material and the recycling of wastes.

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