Heavy metal content in final disposal garbage site at Banda Aceh City

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Abstract. The process of continuous landfill in the area of the final disposal (landfill) of waste produces pollutants such as leachate (leachate) is a liquid containing dissolved substances and suspended very fine as a result of waste decomposition by microbes. Leachate water contains decomposing organic materials and heavy metal materials. Heavy metals (Cr, Hg, Pb, Cu, Fe, Mn, Zn, Cl) present in leachate water are from waste that has been disposed to TPA Keudah Kota Banda Aceh. The author would like to do research on the adsorption of heavy metals by using Atomic Absorption Spectrophotometer in landfill leachate Banda Aceh. The purpose of this research is to get the absorption of some heavy metals in the landfill leachate by using AAS analysis method. The results of the analysis in landfill leachate solution Banda Aceh by using Atomic Absorption Spectrophotometer its highest uptake in heavy metal parameters Iron (Fe) amounted to 10.9191 ppm, and is followed by the parameters of heavy metals (Ni) 0.9820 ppm, (Zn) 0.4188 ppm, (Co) 0.1698 ppm, (Cu) 0.1198 ppm, (Pb) 0.0602 ppm, (Cr) 0.0502 ppm, (Hg), and (Cu) Cd) the results are not detected (ND). Considering that Indonesia in the future is still faced with environmental pollution problem as a result of the development, the restoration and rehabilitation of contaminated land needs to get mutual attention, such as by using dilution method, stabilization, and phytoremediation technique.

1. Introduction
Waste contains toxic and hazardous pollutants, known as toxic and hazardous waste (B3). The level of danger of toxicity caused by waste depends on its type and characteristics both in the short and long term. The relatively short period of time does not have a meaningful effect, but over the long term it is fatal to the environment [1]. Law No. 32 of 2009 on Environmental Protection and Management relating to Article I paragraph 2, paragraph 20, paragraph 21, verse 22, and paragraph 23 relating to waste, B3, B3 waste and the management of B3 waste [2].

Heavy metal is divided into two types: The essential heavy metal is a certain amount of metal that is needed by the organism. However, the metal can cause toxic effects if in excessive amounts. Examples are: Zn, Cu, Fe, Co, Mn, and others. Heavy metal is not essential is a metal whose existence in the body is still unknown benefits, even toxic. Examples are: Hg, Cd, Pb, Cr, and others. Heavy
metals that pollute the environment, both in air, water, and soil derive from natural processes and industrial activities. Natural processes can come from volcanic rocks that contribute to the air, water, and soil environment. Human activities that can contribute to environmental pollution include industrial activities, mining, fuel burning, and other domestic activities that can increase the metal content in air, water, and soil environment [3].

Several types of metals that can be involved in the bioaccumulation process are As, Cd, Cr, Cu, Pb, Hg, and Zn [4]. The presence of aqueous chromium can lead to degradation of water quality as well as harm to the environment and aquatic organisms. The impact of aquatic organisms is the disruption of the body's metabolism due to obstruction of enzyme work in the physiological process. Chromium can accumulate in the body and is chronic which eventually leads to the death of aquatic organisms [5]. Mercury is toxic and dangerous when it enters the human body. Mercury poisoning can cause damage to the nervous system, digestion, and kidneys. In pregnant women, mercury can pass through the placenta and reach the fetus, where the fetus is more susceptible to mercury side effects than adults. Unfortunately, the mercury that enters the human body does not easily escape by itself. This accumulation over a long period of time, can cause disruption and damage to these organs [6]. The main source of lead is derived from the alkyl lead component group used as an additive to gasoline, as well as food and beverages. This component is toxic to all aspects of life. Lead indicates toxic to the nervous system, hematolgy, hematotoxid and affects renal work [7].

The presence of ferrous metals, cadmium and chromium in landfill leachate is very dangerous because it is a highly toxic metal. The iron, cadmium and chromium metals in leachate will seep into the soil that will contaminate the groundwater. If these three metals seep into the soil it will contaminate the residents' wells [8]. A number of techniques have been performed to reduce the content of some metals in landfill leachate. The most common technique used for the removal of heavy metals in a solution under development is absorption with various absorbents. Efforts to absorb heavy metal pollutants have been made by some prior researchers, using activated carbon as an absorber to absorb Cd metal in landfill leachate. But efforts to absorb other metals are still rarely done [8]. The presence of heavy metal contamination in the waters may be derived from the leachate effluent stream of TPA Gampong Jawa Banda Aceh. This is possible because the location of TPA Gampong Java Banda Aceh is on the banks of the river Krueng Aceh which empty into the sea. In addition TPA is also located close to the location of fish ponds and shrimp. Fish ponds and shrimp is a source of livelihood for surrounding communities.

2. Materials and Methods
The materials used are liquid waste or leachate media in TPA Banda Aceh precisely in Gampong Jawa Keudah. Heavy metals used are all heavy metals (Hg, Cu, Zn, Cd, Fe, Co, Ni, Cr, Pb). The parameters tested were metal content or metal concentration. The equipment used consists of AAS, a sample bottle of plastic material size 100 ml measuring cup 2 L, tank (tong) water from plastic material with a volume of 5 L, label paper, stationery. For a sample of both influent and effluent leachate analyzed directly without destruction process by using AAS (Atomic Absorption Spectrophotometer) Shimazu AA 6300 at a wavelength of 357.80 nm. The fluids were analyzed to determine the heavy metal content present in the sample by standard procedure [1,9]. For each metal being analyzed, the applied gas, air pressure, cathode hollow and the specific current lamp are specified.
3. Results and Discussion

3.1 Leaf Examination by Using AAS Method

For each metal being analyzed, the applied gas, air pressure, cathode hollow and the specific current lamp are specified. For a sample of both influent and effluent leachate analyzed directly without destruction process by using AAS (Atomic Absorption Spectrophotometer) Shimazu AA 6300 at a wavelength of 357.80 nm. Fluid is analyzed to determine the content of heavy metals contained in the sample with standard procedures. **Table 1.** It is the result of analysis of liquid waste landfill leachate by using Atomic Absorption Spectrophotometer (AAS).

The result of analysis shows that heavy metal concentration of Iron (Fe) is 10,9191 ppm the highest. This is also due to the high content of Fe in the landfill leachate ponds. High levels of Fe are characterized by black brown leachate concentration. Judging from the quality standard of waste water based on the regulation of environment minister number 5 of 2014 for iron (Fe) of 5 mg / l. Can be interpreted that heavy metal pollution Fe is above the standard quality threshold. Results of analysis of heavy metal content Nickel, Zinc most after Iron.
Table 1. Result of Liquid Waste Analysis in Pond Landfill TPA

| Parameters     | Analytical Results (ppm) |
|----------------|--------------------------|
| Mercury (Hg)   | 0.0046                   |
| Cuprum (Cu)    | 0.1198                   |
| Iron (Fe)      | 10.9191                  |
| Cadmium (Cd)   | Not Determined           |
| Zinc (Zn)      | 0.4188                   |
| Cobalt (Co)    | 0.1698                   |
| Nickel (Ni)    | 0.9820                   |
| Chromium (Cr)  | 0.0502                   |
| Lead (Pb)      | 0.0602                   |

3.2 Heavy Metal Content

Heavy metal in certain quantities is needed by the organism, but the metal can cause toxic effects if in excessive amounts. Such as the concentration of heavy metals Zn, Cu, Fe, Co, Mn contained in Table 1. But be careful because if accumulated can be dangerous. From the analysis result using AAS concentration of mercury heavy metals (Hg) for absorption analysis 0.00463 ppm; Lead (Pb) absorption analysis of 0.0602 ppm; The concentration of chromium (Cr) absorption analysis was 0.0502 ppm. Judging from the SNI Standard mercury is above the standard quality threshold, while Cr and Pb are still below the SNI threshold. But we still have to be vigilant and careful because heavy metal let alone non essential because of the nature of the poison.

The need for handling heavy metal pollution in addition to using rinsing and washing methods as well as dilution and stabilization methods. Indonesia has the potential of plant biodiversity that can be used as a plant that has the ability to degrade and accumulate heavy metals (hiperaccumulator). Until now it has discovered 120 species of plants that can be used for engineering, among others Alaman phytoremedias sp. Canasp, Pisang mas, grains, red anthurium and yellow, Bamboo water and so on. According to [10] in Malaysia has found about 400 species of plants that have the ability to be used in phytoremediation techniques. Phytoremediation techniques are the simplest and most economically inexpensive technique when compared to other remediation techniques for the recovery of contaminated land by heavy metals.

Considering that Indonesia in the future is still faced with environmental pollution problem as a result of industrial development and disposal, efforts to restore and rehabilitate contaminated land need to get our attention together. This time though the technology fitoremediasi has not been widely applied in the recovery of the pollution of soil and water, in the future is expected to become the technology of environmental cleanup potential, supported by the biodiversity of plants in Indonesia that can be used as a plant hiperakumulator, so that the program of sustainable development (sustainable development) can be achieved.

4. Conclusion

Based on the research results can be drawn conclusion; Analysis of leachate waste in Banda Aceh city landfill using AAS method to heavy metal parameters, the results obtained there are only some concentrations of heavy metals above the quality standard such as heavy metal Iron (Fe) of 10.9191 ppm. Heavy Metals Zn, Cu, Fe, Co, Mn. Heavy metal Hg, Cd, Pb, Cr including non-essential heavy metals because of its toxicity and its presence in the body have not known the benefits. Considering that Indonesia in the future is still faced with environmental pollution problem as a result of industrial development and disposal, the efforts of restoration and rehabilitation of contaminated land need to get our attention together to realize sustainable development such as dilution method, stabilization, rinsing and phioremediation techniques.
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