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ANALYSIS OF MERCURY (HG) LEVEL IN GOLD PROCESSING CONTAINER USING TRADITIONALTOOL IN PAYA ATEUK VILLAGE, PASIE RAJA, SOUTH ACEH

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Abstract

Mining activities has some negative effects. One of them is mercury pollution caused by gold processing through amalgamation. The data of this study was collected through mercury parameters analysis on liquid waste in laboratory. The examination of sample was carried out at Laboratory of Research and Industrial Development and Industrial Standardization Institute in Banda Aceh. The sample used was traditional gold processing water in Paya Ateuk Village, SouthAceh. The results showed the value of mercury level is 0.0149 mg/l or above the specified threshold. Improving the management of traditional gold processing is not only the responsibilityof miners, but also involve cross sectoral so that mercury does not pollute the environment.

Keywords**: *Parameters, Mercury, Gold Processing, Traditional Tool.***

1. INTRODUCTION

Mercury or quicksilver (Hg) is a liquid metal when placed in the temperature room. Mercuryis classified into two forms; They are oxidized Hg (II) which is more soluble in water, and in the form of Hg (p) which can bind to particulates or aerosols. Mercury (Hg) is the most dangerous heavy metal in the environment. Gold processing by amalgamation can cause environmental pollution (WHO in Athens, 2005).

Indirectly, traditional gold mining activities have some negatives impact. One of them is thepollution of heavy metal mercury in the surrounding environment. In traditional gold mining, the gold processing result is conducted through amalgamation. Mercury comes to the environment atwashing and grinding gold stage as stated by Purnaman on his research (2013), one of the sources

of mercury pollution comes from gold mining carried out by the community using the amalgamation method. Mercury can be released into the environment at the washing stage (Purnawan, 2013). In addition, Research of Kusuma (2017) in Kulon Progo gold mining site foundthe Hg value for surface water at the research site was below the detection limit or still in good environmental conditions, while the Hg value for river sediments ranges from 7.57 to 8.43 ppb with the location with the highest Hg content being the upstream area.

Based on initial survey result conducted in Paya Ateuk Village, Pasie Raja, South Aceh, it was found the community used gold ore processing equipment with logs. Gold mining waste in this location comes from local mining carried out by the community. The impact of gold mining process contained with mercury (Hg) is very dangerous to the aquatic environment and the degree of public health.

Based on a preliminary study by researchers at traditional gold mining sites in South Aceh Regency, liquid waste from gold processing is still being disposed of carelessly without any prior processing. So far, the problem of liquid waste from traditional gold mining has not been handledproperly. Traditional gold mining liquid waste at a certain concentration will harm the surroundingenvironment if not treated well. The purpose of this study was to analyze the

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characteristics of heavy metal mercury before and after processing in gold processing wastewater in Paya Teuk village, Pasie Raja, South Aceh. The specific target is to remove metallic mercury in wastewater from traditional gold mining processing.

2. IMPLEMENTATION METHOD

The data in this study was collected through mercury parameters analysis in the liquid waste in the laboratory. The sample examination was carried out at the Laboratory of the Research and Development of the Industrial Research and Standardization Institute of Banda Aceh. The Atomic Absorption Spectroscopy (ASS) method used to show the results of testing the mercury (Hg) parameters contained in the residual liquid waste from gold processing activities in Paya Ateuk Village.

The measurement of mercury (Hg) parameters using the Indonesian National Standard (SNI) 6989.78.2011. The use of this method in testing research samples to test mercury (Hg) contained in residual liquid waste from gold processing activities using ASS which is first carriedout by steam cold or mercury analysis according to SNI 6989.78.2012 has a range of 1 g Hg/Lto 20 g Hg/L. The principle is that the ion (Hg2+) which is reduced by Sn+2 turns into an atom with the name Hg so that the atom can be analyzed quantitatively by means of a spectrophotometer, which becomes an atom of cold vapor with a range of 253.7 nm.

3. RESULTS AND DISCUSSION

3.1 Result

Based on the results of the examination of liquid waste sample remaining from goldprocessing at the Laboratory of Research and Development of the Industrial Research andStandardization Institute of Banda Aceh using the Atomic Absorption Spectroscopy (ASS) methodwith SNI Test standard. 6989.78-2011, it was found the value is 0.0149 Mg/L (Table 1). It has exceeded the mercury level limit in accordance with Government Regulation Number 82 of 2001concerning Water Quality Management and Water Pollution Control, which is 0.001 mg/l.

Table 1 The Results of Examination Liquid Waste Samples Remaining From Gold Processing

No	Test Parameter	Test Method	Unit	Test Result
1	Mercury (Hg)	SNI. 6989.78-2011	Mg/L	0,0149

Source; *Laboratory of the Research and Development of the Industrial Research and Standardization Instituteof BandaAceh*

3.2 Discussion

Gold processing is carried out directly at the gold extraction site with amalgamationtechniques using mercury. The mercury has been used by miners because it is easy to obtain, and it is not handled properly by the government. After the process of amalgamation, the waste (tailings) containing mercury is discharged to a holding pond located around the mining site and left without further processing. The concentration of Hg in the waste is 800 – 6900 ppm (Larasati,et al, 2012).

The results of this study as shown in table 1 is 0.0149 ppm (mg/L), which indicated the valueexceeds the quality standardfor the presence of mercury in water, which is 0.001 mg/L. The

resultsof this study are also in line with research conducted by Elawati 2017 which also found mercury.

4. CONCLUSION

Based on the results of this study, it can be concluded the presence of mercury on wastewater from traditional gold processing in Paya Ateuk Village, South Aceh exceeds the thresholdstipulated in Government Regulation Number 82 of 2001 concerning Water Quality Managementand Water Pollution Control. The presence of Mercury in excessive amounts will be dangerous to the surrounding environment if not managed properly. Beside the awareness and proper management of traditional gold miners, cross-sectoral cooperation is needed both in terms of managing the residual water from gold processing and in formulating regional policies and regulations, so the possibility of environmental pollution due to Mercury can be minimized.

levels exceeding the standard limits for mercury levels in accordance with Government RegulationNumber 82 of 2001 concerning Water Quality Management and Water Pollution Control, which is 0.001 mg/l (Elawati, 2017). It is certainly not good if the mercury-contaminated wastewater enters water bodies that are used by residents. Mercury that has polluted the environment can contaminate existing biota and will be very dangerous if consumed by residents because of its accumulative nature.

Mercury has several detrimental and dangerous effects if consumed by humans, including disorder of liver and kidney function, as well as interfering enzyme systems and synthetic mechanisms (Darmono, 2001). Long-term exposure to mercury causes health problems in humans.Mercury poisoning is prone to occur in the communities living around the mines. Generally,it is chronic unless exposed to high levels of mercury (Widowati, 2008).

The toxic effects of heavy metal mercury depend on its form, route of administration, and duration of development. Mercury enters the body through breathing, digestion, and skin. Mercurythat enters the body accumulates in certain body parts such as kidneys, liver, nails, fat tissue, andhair which causes poisoning in the nervous system (Chamid, 2010). The results of Soprima's research et al in 2015 regarding the risk factors that allow mercury exposure in humans found thatthe presence of mercury at the research site in water, fish, vegetables, and soil had exceeded the quality standard, which respectively had an average of 0.04695 mg /1, 0.5175 mg/kg, 0.173 mg/kg and 0.165 mg/kg which based on the results of the health risk calculation analysis shows that the community around the people's gold mining has the potential to receive health problems because the RQ value> 1 (RQ = 18.5756) (Soprima ,2015).

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