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Research Article

Identification of Cyanide in Sediment of River in Hulawa Village

Rahman Suleman[1,*], Yeyen Afrianti Amma[2]

[1] Program Studi Sanitasi Lingkungan, Poltekkes Kemenkes Gorontalo; rahmans@gmail.com
[2] Program Studi S1 Ilmu Gizi, STIKES Bakti Nusantara Gorontalo

Abstract: (1) Background: mining activities in Hulawa Village have caused heavy metal contamination in the surrounding environmental ecosystem. This is caused by the waste from gold processing which is dumped directly into the river body. The purpose of this study was to determine the Cyanide content in the sediment river in Hulawa Village; (2) Methods: this research is a descriptive study, using a purposive sampling method, with the sampling location at the midpoint of the river. This research was conducted in August-September 2020. The sediment sampling technique used the JPHA guidelines, and the cyanide examination in the sediment used the AAS test; (3) Result: the sediment samples obtained were then taken to the WLN laboratory in Manado to be tested for cyanide content. The test results showed that the cyanide content in the sediment was <0.5 mg/kg; (4) Conclusion: apart from heavy metal Mercury (Hg), the river in Hulawa Village has also been polluted by heavy metal Cyanide (CN). Cyanide content is still less than 0.5 mg/kg due to its not yet intensive use. However, if used continuously by miners, the possibility of cyanide accumulating in large quantities cannot be avoided, and this can have a health impact on the people in Hulawa Village.
Keywords: Cyanide; sediment; river

1. Introduction

Heavy metal pollution in the environment caused by mining activities has occurred in various parts of the world (Veiga et al. 2005; Baki et al. 2018; Vieira et al. 2013; Arifin et al. 2018; No EEAR, 2018; Sverdrup and Olafsdottir, 2020). Heavy metal contamination in large quantities can cause negative impacts on public health who consume or are exposed to metal contamination either through the mouth, breathing, or skin (Funoh, 2014). Traditional gold mining is known as one of the biggest contributors to this pollution because heavy metals are one of the important materials used in gold processing (amalgamation process) (Mallongi et al. 2015; Palapa et al. 2015).

One of the indicators used to assess the accumulation of heavy metals in waters is air, river, and sea sediments (Vieira et al. 2013; Palapa et al. 2015; Ronoko et al. 2019; Arifin et al. 2020; Smits, 2014), and bioaccumulator microorganisms (Mehana et al. 2020; Stankovic, 2013; Samsi et al. 2017) that live in the waters around mining. The purpose of this study was to identify the cyanide content in river sediments in Hulawa Village.

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2. Materials and Methods

Material

The materials used in this study were sediment traps, plastic containers, and paralon pipes. The sampling technique refers to the guidelines of the Japan Public Health Association (16), with the criteria that the sediment taken is at a depth of 10-15 cm, using a paralon pipe. To test the cyanide content using the AAS test.

Method

This research is descriptive, with a purposive sampling method. Data collection method for liquid sample destruction refers to SNI 6989.6:2009 regarding the Copper test method, while for sediment refers to the method of destruction of solid samples (sediment and fish) namely The Aqua Regia Digestion Method U.S.A EPA (Environmental Protection Administration). Sample testing was carried out by the method of Atomic Absorption Spectrophotometry (AAS). Data processing methods were obtained by comparing the data obtained from the results of sample testing with AAS, then compared with the specified quality standards. Methods and protocols should be described in detail while established methods can be briefly described and cited appropriately. Please describe your statistical analysis if using statistical analysis.

3. Results

Table 1. Description of the condition of the Hulawa Village community based on age

Location	Variable	Category	Total	%
Hulawa	Age	Less than 30 age	21	25.6
		30-50 Age	45	54.9
		More than 50 Age	16	19.5

Table 2. Description of the condition of the Hulawa Village community based on education background

Location	Variable	Category	Total	%
Hulawa	Education background	Ungraduated Elementary School	47	57.3
		Graduated Elementary School	19	27.2
		Graduated Junior School	4	4.9
		Graduated High School	5	6.1
		Graduated Bachelor degree	7	8.5

Table 3. Description of the condition of the Hulawa Village community based on gender

Location	Variable	Category	Total	%
Hulawa	Gender	Woman	44	54.0
		Man	38	46.0

Table 4. Description of the condition of the Hulawa Village community based on length of stay

Location	Variable	Category	Total	%
Hulawa	Length of stay	5-25 Years	40	48.8
		26-50 Years	30	36.6
		>50 Years	12	14.6

Table 5. Result of cyanide test

No	Test Description	UoM	Result	GRL	Method reference	Rem Q
Cyanide						
1. Cyanide (Total)		mg/kg dry	<0.5	n/a	WI-(ID)-[EHS]-LA-019	

4. Discussion

The location in this study is in the gold mining area of Hulawa Village, which is located in the west of East Sumalata District, North Gorontalo Regency, Gorontalo Province. Mining activities in Hulawa Village have been operating since 1899. Furthermore, starting from 1970 until now, mining in Hulawa Village is still operating but has been carried out by the local people with the Unlicensed Mining (PETI) model.

Respondents in this study were people living around the gold mining area of Hulawa Village, with a total of 82 people. Based on age (Tabel 1), respondents aged under 30 years were 21 people (25.6%), those aged 30 to 50 years were 45 people (54.9%), and those aged over 50 years were 16 people (19.5%). Based on the education background variable (Table 2), as many as 47 people (57.3%) of respondents did not graduate from elementary school, respondents who graduated from junior high school were 4 people (4.9%), who graduated from high school as many as 5 people (6.1%), and 7 people graduated from college. people (8.5%). Based on gender (Table 3), consisting of 44 female respondents and 38 male respondents. Based on the length of stay (Table 4) of the respondents, there are 40 respondents (48.8%) who have lived in Hulawa Village for 5-25 years, as many as 30 respondents (36.6%) have lived for 26 to 50 years, and 12 people (14.6%) other respondents. has been living in Hulawa Village for more than 50 years.

The result of the cyanide test (Table 4) shows that the sediment sample has positively contained cyanide, however the concentration is still at the lowest level (<0,05 mg/kg). It may cause by the usage of cyanide not significantly often rather than mercury, which is applied in the gold extraction process.

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Conflict of Interest

This research aims to reveal the concentration of cyanide in the sediment of the river, and involved no other interest, therefore; the authors declare that they have no competing interests.

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Ethical Issues

This research does not involve humans or animals, therefore; no need for ethical issues

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