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# HEAVY METAL ANALYSIS CO AND V ON SEDIMENT DISTRICT OF MAMUJU DISTRICT USING INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROSCOPY (ICP-OES)

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## ABSTRACT

This research concerning heavy metal analysis of Co and V on Mamuju Regency water sediments using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Sediment sampling was conducted on four stations, namely the mouth of the Mamuju river, the mouth of the river Karema, the mouth of the river Rimuku, and front of Manakarra beach platform. The results showed that Co metes ranged from 0.167-0.208 mg/L while for metal V ranged from 0.649-0.944 mg/L. Of the three metals in the analysis are still below the threshold of metal quality standards in sediments or can be said not polluted.

**Keywords**: Co, V, Heavy Metals, ICP-OES, Sediment

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## 1. INTRODUCTION

West Sulawesi Province was a newly formed province in 2004 and is a division of South Sulawesi Province[1]. The total area of West Sulawesi Province is 16,916.72 km2 which covers 5 regencies and Mamuju regency is the largest regency of 4,832.70 km2 or 28,57% from all region of West Sulawesi [2].

The territorial waters of West Sulawesi, especially the waters of Mamuju Regency, are the areas affected by the development of the city which is marked by the industrial development that resulted in the decline of water quality [3]. Water quality is influenced by two important factors: natural pollution and anthropogenic contamination. Pollution is naturally natural pollution such as erosion, landslides, floods, and other natural phenomena. While contamination is anthropogenic pollution into the waters due to human activities, such as domestic activities (households), urban and industrial activities [4]. Pollution due to domestic activities, industry, and natural processes can contribute to the increase of metal in the waters. As for some metals that have high potential in water pollution that is Co and V metal. The metal is mostly obtained from household waste, industry and from natural process [5].

Heavy metals that settle together with suspended solids will affect the quality of the sediments in the bottom of the waters and also the watersaround it so that bad for marine biota [6]. Sediments naturally undergoing erosion process illustrate the

number of pollutants in surface water [7]. Sedimentation processes in the waters can lead to silting and degradation of water quality. In addition, the high concentration of sediments in water bodies will cause turbidity that not only endangers biota but also causes unproductive water [8].

Based on the above description, that the anthropogenic and natural processes have the potential to increase the pollution of heavy metals in the water area. Therefore, the research was conducted to find out the heavy metal content of Co and V in sediment in Mamuju River waters using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) to anticipate changes in water quality due to urban development

**Table 1**. Sampling Location

| Station | Geographical location | | Depth (meters) |
|---|---|---|---|
| | South latitude | East longitude | |
| I | 02°39'53.5" | 118°54'01.7" | 1 |
| II | 02°40'12.1" | 118°53'19.8" | 3 |
| III | 02°40'25.9" | 118°53'02.4" | 2 |
| IV | 02°40'43.7" | 118°52'24.1" | 2 |

## 2. METHODS

### 2.1 Sediment Sampling

Samples were taken using Van Veen Grap Sampler. Sediment samples were taken at 4 different points as shown in Table 1.

Station I taken at the mouth of the Mamuju river, station II in front of Manakarra beach platform, station III at the mouth of the Rimuku river, and station IV at the mouth of the river Karema. Then the sample that has been obtained is inserted into the plastic bag where the sample has been provided previously.

### 2.2 Preparation of Sediment Samples

The wet sediment samples are dried by insertion into an oven at 100 °C. Samples that have dried, crushed until smooth by using porcelain crucible.

### 2.3 Analysis of Co and Co heavy metals using ICP-OES [9]

The sample was weighed as much as 1 gram and put into the crucible porcelain then sprinkled 2 grams of $Na_2CO_3$ then put into the furnace at a temperature of 800 °C for 2 hours. After that, the damaged sample was added aqua regia. Then stand for ± 12 hours. Then transferred into a beaker, then heated to almost dry. After that, the soluble sample was added 10 mL of Iacides, then filtered. The filtrate of filtrate was then introduced into a 50 mL measuring flask. Then squeezed with akuabides up to the boundary mark. Then analyzed using ICP-OES

## 3. RESULT AND DISCUSSION

### 3.1 Concentrations of Cobalt Heavy Metals (Co) in Sediments

Metal Co. is a metal that is widely used as a mixture of materials for the manufacture of household appliances such as cutting tools, glass dyes, ceramics, and paints. The results of Co metal analysis on sediments in the waters of Mamuju Regency can be seen in Figure 1.

Figure 1 shows that the concentration of Co heavy metals in the highest sediments is in Station I compared to Station II, Station III and IV. The high levels of Co metal at Station I are in addition due to the presence of Co metal which is also naturally caused

by the location which is located near from the urban activity resulting in the amount of waste of organic and inorganic waste containing heavy metals and the existence of port activity close to the location resulted in the carrying of Co metal to the bottom waters and then settles as sediment. Station IV has the second highest concentration after Station I resulting from other plantation and urban activities the input of palm oil industry waste also increases the concentration of Co metal compared to Station III and II which only get Co metal input from urban activity.

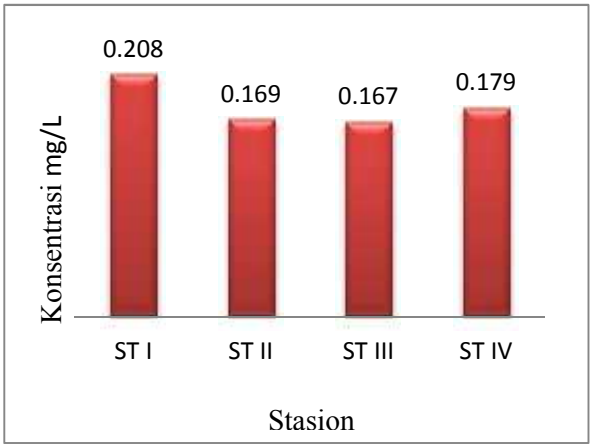


**Figure 1**. Diagram of Co Concentration in Sediments at various Stations

The high concentration of Co metal is also thought to be influenced by the depth of the location where at Station I taken at a depth of 1 meter has a higher Co metal concentration of 0.208 mg / L compared with Stations IV and III taken at a depth of 2 meters has a concentration of 0.179 mg / L and 0.167. Station II taken at a depth of 3 meters has a Co concentration of 0.169 mg / L. The high concentration of Co metal taken at a depth of 1 meter is due to the metal on the surface of the sediment is a relatively new accumulating metal. This is in accordance with the results of research conducted by Batley, 1987; Siaka, 1998, states that the lower down of the sediment surface the smaller the metal content

### 3.2 Concentrations of Heavy Metal Vanadium (V) in Sediments

The average content of vanadium in rocks in the earth's crust is about 136 ppm which is the fifth most transitional element after Fe, Ti, Mn and Zr. In addition to anthropogenic, vanadium metal is obtained from stainless steel products and equipment used in high speed. In the body of Vanadium prevents the formation of cholesterol and is essential for the growth of bone, cartilage and teeth. The result of metal V analysis on sediment in Mamuju Regency waters can be seen in Figure 2

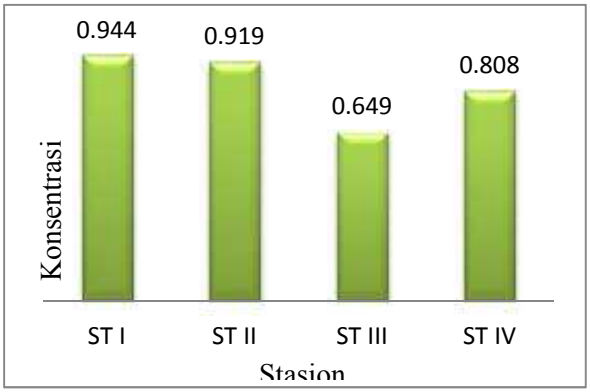


**Figure 2**. Diagram of V Concentration in Sediments at various Stations

Figure 2 shows the highest concentration of heavy metals V in sediments found at Station I which is similar to Station II. While the lowest metal V concentration at Station III and Station IV. The high content of metal V at Station I is due to the location close to the mamuju port and urban activity resulting in heavy input of heavy metals from domestic waste. The highest content of metal V is also present in

Station II, due to the location of sampling that is located close to the coast also affects the high concentration of metal V due to the large number of household waste disposal, in addition there is also a natural factor where the distribution of metal V in the rock location is basically more many of the stations III and IV.

When viewed from the depth of location of metal concentration of V at Station I taken at a depth of 1 meter is almost equal to the concentration of metal V at Station II taken at a depth of 3 meters of 0.944 mg / L and 0.919 mg / L. While in Station IV and III taken at a depth of 2 meters has a concentration of metal V of 0.808 mg / L and 0.649 mg / L.

### 3.3 Comparison of Co and V Heavy Metals Concentrations in Aquatic Sediments of Mamuju Regency

Figure 3 shows the metal concentration at Station I which is the mouth of the mamuju river is the station which has the highest Co and V metal content. Due to the dense population around the river mouth triggered heavy input of heavy metals due to human activities derived from household and industrial waste.

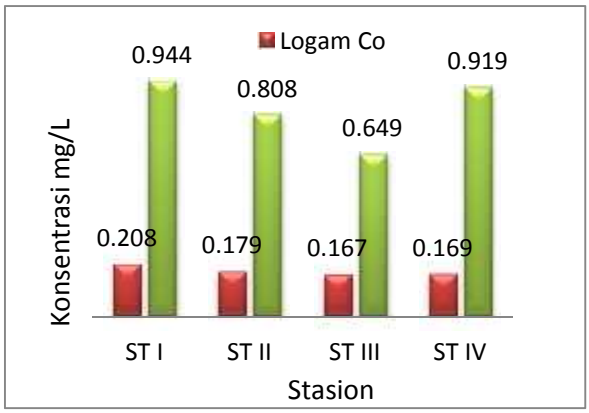


**Figure 3**. Concentration Diagram Co, and V in Sediments at various Stations

At each metal station V is the metal having the highest concentration of Co metal due to the amount of household waste such as iron and cramme at each station. In addition to the anthropogenic process, it is suspected that the high metal V is also caused by natural processes.

## 4. CONCLUSION

The concentrations of Co and Cu heavy metals in sediments in Mamuju waters were found in Co metal ranged from 0.167-0.208 mg / L and metal V ranged from 0.649-0.944 mg / L still below the standard threshold of metal in sediment.

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