The Identification on Iron Compound of Nature Sand in Ampenan Beach Mataram

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Submission date: 31-May-2020 04:20PM (UTC+0700)
Submission ID: 1335073475
File name: ICST_2016_Annisa_khair_susi_aris_46-149_copy.pdf (139.47K)
Word count: 1325
Character count: 7100

The Identification on Iron Compound of Nature Sand in Ampenan Beach Mataram

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Abstract

The research was conducted on the nature sand of Ampenan Beach, Mataram City to determine the percentage of metal content of iron (Fe) which is will be used as a basic ingredient in the synthesis of Barium M-Hexaferrites. Iron sand is sediment containing magnetite (Fe_3O_4), maghemit (γ- Fe_2O_3) and hematite (α- Fe_2O_3) as major minerals and some other mineral which is the mineral support. Magnetic separation of the natural sand using a permanent magnet has successfully separate the parts are magnetic (iron sand) and non-magnetic. To get extraction, the iron sand can be executed by destruction with concentrated acid (HNO_3 + $HClO_4$). Extraction and analyzed by using Atomic Absorption Spectrophotometry (AAS) which show that the iron sands contain metals amounted to 11.15% Fe.

Keywords: *Fe, nature sand, Atomic Absorption Spectrophotometry*

1. Introduction

Sand is a natural ingredient that isvery abundant in Indonesia.Natural sand contains many valuable minerals containelements iron, titanium, and other elements that can be utilized for industrial materials [1].Potential and distribution of ore iron in Indonesia are often found in various area such as: the west coast of Sumatra, southern coast of Java, Borneo, Sulawesi, Nusa Tenggara, and Maluku Islands, but so far the exploration activities not been done fully and systematically [2].Research that has been done previously found that 60.8% of natural sandstone contain magnetic minerals [2] with a metal content of iron (Fe) about 87.5% [3].Separation of magnetic minerals are managed to separate the parts of magnetic (ore iron) and non-magnetic [4].Magnetic mineral separation process can use a permanent magnet (magnetic separator) [5].

Sand iron compounds contain*magnetite* (Fe_3O_4) [1,3,6,7], *hematite* (α-Fe_2O_3) [3,4,6,8] as the main minerals (predominantly compound) and *maghemite* (γ -Fe $_2$ O $_3$),*silica* (SiO_2)[1,3,4,6,7], *alumina* (Al_2O_3),*rutile* (TiO_2)[4.7], and *ilmitite* ($FeTiO_3$)[6] as a minor compound.The differences levels of mineral content due to geological structure and mineralization processes in each region.These minerals are magnetic 88% and 12% do not have magnetic properties [3].These minerals have the potential to be developed as an industrial material.For example magnetite can be used as a base material dry ink (toner) on a copier and laser printer [3], in industries such as ceramics, catalysts, energy storage, magnetic data storage device,Ferro fluid, as well as in medical diagnostics [9], absorbing radar waves [10].The maghemit is the key ingredient of a tape [1].

Natural sand contained in the beach also comes from the river.Natural sand in the river has similar physical appearance with natural sand at the beach.The sand river also have a sand iron and mineral content similar to the natural sand beach.Based on research that has been done before it is known that the average percentage of iron sand from the river sand is

smallercompared to the average percentage of iron sand from the sand beach, with the main minerals are *albite* ($NaAlSi_3O_8$) [1].

This study examined the content of iron (Fe) in natural sand by using equipment Atomic Absorption Spectrophotometry (AAS).This test aims to determine the amount and presentation of the mineral content of iron (Fe) in natural sand to be used as raw material in the synthesis of microwave absorbing materialsare Barium M-Hexaferrites (BAM).

2. Materials and Methods

The equipment used in this study such as measuring cups, pumpkin destruction, filter paper, funnel, pipette, spatula, analytical balance, magnets neodymium, heating, test tubes, test tube rack, flask, micro pipette.The basic ingredients we used in this studyis taken from the natural sand Ampenan Beach, Lombok near the mouth of the river.Solution of HNO3 and HClO4 used in wet destruction process, and distilled water as a solvent when dilution.The measurement of magnetic mineral content aims to determine the percentage content of magnetic minerals that contained in natural sand.Measurements has made with a permanent magnet in a way closer to the natural sand.Iron sand that sticks to the magnet is a magnetic mineral.The percentage of magnetic minerals can be calculated using equation 1 [2]:

$$MM(\%) = \frac{magnetic\ materials\ mass}{total\ mass} \times 100\ \% \qquad (1)$$

The process of testing the metal content of iron (Fe) can be seen in the following flowchart (Figure 1):

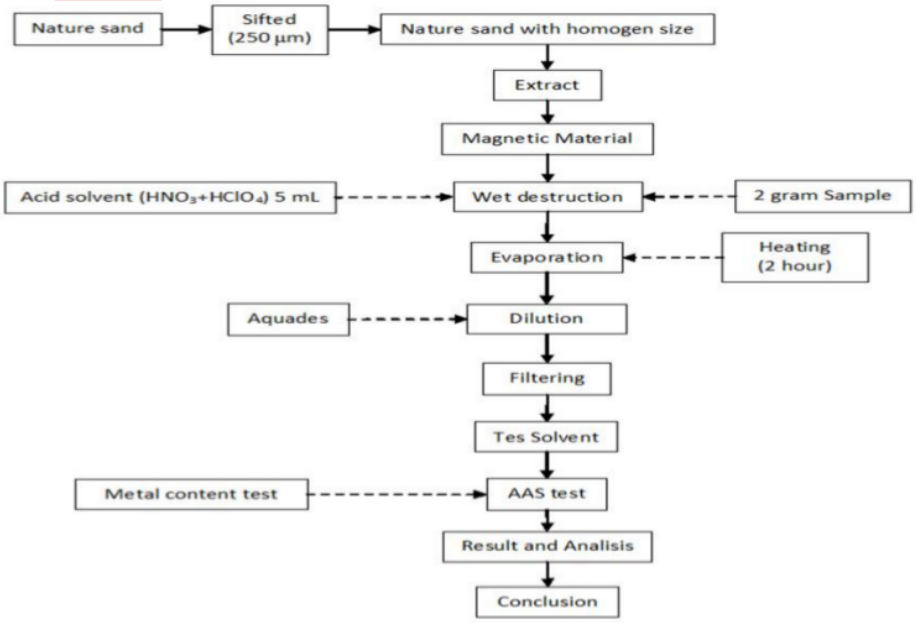

Figure 1. The flowchart of identification iron in nature sand using AAS

3. Results and Discussion

Iron sands extraction of natural sand by using a permanent magnet powered 1.48T showed that 50 grams of natural sand (Figure 2a) were homogenized using a sieve size of 250 µm and have 24 grams of magnetic minerals (Figure 2b), or there are about 47, 21% of magnetic minerals in the natural sand.

(a) (b)

Figure 2.The homogen nature sand (a); the magnetic minerals (b)

Then analyzed using AAS to determine the metal content of iron (Fe) and obtained the data as shown in the tables below:

Table 1 Result of AAS Analyte

		Analyte	Mean
1	Fe-I	Fe 305.91	44.24 mg/L
2	Fe-II	Fe 305.91	46.09 mg/L
3	BLK	Fe 305.91	-0.406 mg/L

Table 2. Result of Iron Percentace

		Content of Metal (ppm)	Percentace (%)
1	Fe-I	109.067,600	10,9068
2	Fe-II	113.898,0872	11,3898

4. Conclusion

Based on the results of the research that has been done, the iron sand successfully extracted using permanent magnets obtained by percentage of magnetic minerals by 47.21% in 50 grams of natural sand.Test analysis of metal content of iron (Fe) in mineral obtained by using AAS showed that the samples of Fe-I are 109,067.600 ppm Fe with a percentage of 10.9068% and the Fe-II samples contained metal 113,898.0872 ppm Fe percentage of 11.3898%.The average percentage of Fe in both samples is 11.1483%.This amount can be quite high.

5. Acknowledgments

This research, have been sponsorship by PUPT research of Departemen Reaserch and Technology 2016. Thank you very much to Mataram University Research Center for helping at administration procedure. Futhermore thank giving to Analytic Laboratorium Mataram University and LIPI Serpong Jakarta.

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