HEADING

(Title in Indonesian, clear and concise, Times New Roman typeface, font size 14, bold, single space, before paragraph 0, after paragraph 0, maximum 20 syllables)

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ABSTRAK *(times new roman, font size 14, spasi tunggal, before paragraph 0, after paragraph 0,)*

Abstrak dituliskan dalam bahasa Indonesia dan bahasa inggris menggunakan jenis huruf Times New Roman dengan font size 11, spasi tunggal, panjang abstrak tidak lebih dari 150 kata. Abstrak dapat menggambarkan informasi kualitatif dan kuantitatif. Cantumkan 5 kata kunci terkait dengan abstrak, setiap kata kunci dibuat dalam urutan abjad. Limbah oli bekas mengandung beberapa zat pencemar. Diantara zat pencemar tersebut adalah logam berat yang termasuk dalam golongan limbah B3. Pada artikel ini akan diuraikan hasil dari penelitian mengenai uji kemampuan kitosan dan selulosa dalam menjerap logam pencemar Fe dan Zn yang terkandung di dalam limbah oli bekas dengan metode kolom filtrasi. Limbah oli bekas dilewatkan pada suatu kolom filtrasi yang telah diisi kitosan dan selulosa dengan perbandingan (kitosan:selulosa w/w) berturut-turut; 3:1, 6:1, dan 9:1, kemudian dianalisis kandungan Fe dan Zn pada masing-masing sampel untuk mengetahui prosentase perubahan konsentrasi logam Fe dan Zn di dalam limbah oli bekas dengan instrument AAS.

Kata kunci: filtrasi, kitosan, limbah oli, logam.

ABSTRACT *(times new roman, font size 14, single space, before paragraph 0, after paragraph 0,)*

The abstract is written in Indonesian and English using the Times New Roman font with a font size of 11, single space, abstract length of no more than 150 words. Abstracts can describe qualitative and quantitative information. List 5 keywords related to the abstract, each keyword is created in alphabetical order. Waste oil contains several pollutants. Among these pollutants are heavy metals that are included in the B3 waste group. In this article, the results of the research on the ability of chitosan and cellulose to capture Fe and Zn polluting metals contained in used oil waste by the filtration column method will be described. Waste oil is passed through a filtration column that has been filled with chitosan and cellulose in a ratio (chitosan: cellulose w/w) sequentially; 3:1, 6:1, and 9:1, then the Fe and Zn content in each sample was analyzed to determine the percentage change in Fe and Zn metal concentrations in used oil waste with AAS instruments.

Keywords: filtration, chitosan, waste oil, metals.

INTRODUCTION *(times new roman, font size 12, space 1.5)*

The Analit Journal will publish scientific papers in the field of chemistry. Writing can be in the form of dissemination of research results, comprehensive scientific literature reviews or reviews of scientific books. Overall, the manuscript of the research results must contain an abstract, introduction, research objectives, research methods, discussions, conclusions, acknowledgments (if any) and literature or references.

The writing format uses Times New Roman font, font size 12, space 1.5 with A4 paper size, top and bottom margin left and right 3 2 2,54 2,54 cm. The beginning of the paragraph is written inward. The writing of chemical notation follows the applicable standard rules, for example Al2O3 and $Ni(NO_3).6H_2O$. Each page should be numbered in the lower-right corner. If there are words in a foreign language in the manuscript, write them in *italic font*. The manuscript is saved in MS-Word format.

The introduction of the manuscript presents the background of scientific research/writing, a literature review that directs the introduction to the formulation of the problem, the up-to-date of the article to the literature review, and the purpose of the research/writing.

Lubricating oil is made from base oil from the result of the petroleum cracking process with the number of C atoms ranging from C 18 to C 20. said about 1% of petroleum is processed into lubricating oil. The process of making lubricating oil from base oil began in 1850. Lubricating oil has a fairly high boiling point, which is 300 – 350℃ with a fairly high viscosity value.

According to BPS data, the use of lubricating oil for large and medium industries reached 111,614,288 liters in 2013.Meanwhile, according to data from the monitoring of import details from the Ministry of Industry, Indonesia experienced an increase in imports of unprocessed fuels and lubricants by 11.00% and processed oils by 62.84% in 2010. The more lubricating oil is consumed, the more waste used lubricating oil is produced. It is important to reduce pollutants in oil waste so that used oil can be reused so as to reduce the use of petroleum and prevent environmental pollution.

METHOD *(times new roman, font size 12, spacing 1.5)*

Tools and Materials *(roman times 12, space 1.5)*

The writing format uses the Times New Roman typeface, font size 12, space 1.5. The main tools used in this study are a filtration column made of glass and an atomic absorption

spectrophotometer analysis instrument (Shimadzu 6800AA). The materials used are Industrial Grade Chitosan, cellulose from coconut fibers, and waste oil (car oil) that has been used once.

Procedure ***(roman times 12, space 1.5)***

Research procedures can contain the course of research or how it works. If possible, describe in detail how to obtain data, process data and interpret data.

Chitosan and coconut fibers are weighed and then put into the filtration column. The column contains chitosan whose composition varies with coconut fibers, namely: 3:1, 6:1, 9:1. Waste oil is fed into the filtration column from the top of the filtration column, then the waste oil will flow with gravity downwards through the filter at the bottom of the filtration column. When the used oil has reached the bottom of the filtration column, the permeat will come out and be accommodated into a sampling bottle or glass cooler as a metal separation product.

RESULTS AND DISCUSSION *(times new roman, font size 12, space 1.5)*

Analysis of Fe and Zn Metal Content in New and Used Oil *(bold, new roman, font size 12, before paragraph 0, after paragraph 0, spacing 1.5)*

The writing format uses the Times New Roman typeface, font size 12, space 1.5. The discussion includes the results of the research and its discussion comprehensively. The results of the research are not separated from the discussion as a whole and continuously. In presenting data in the form of tables, use a table format like the example Table 1. If there is more than one table, use table numbering, for example, Table 1, Table 2, and so on. The image listed must be mentioned in the paragraph located before or after the image. The presentation of images also follows numbering just like table numbering. For example, the presentation of Figure 1 and Figure 2.

The analysis of Fe and Zn metal content aims to determine the standard content of Fe and Zn in new oil and to find out what is the metal content of Fe and Zn in used oil before it is given filtration treatment. The analysis was carried out using an AAS spectrophotometer. The following are the results of the analysis of Fe and Zn metal content in new and used oil.

Filtration *(bold, new roman, font size 12, before paragraph 0, after paragraph 0, spacing 1.5)*

In Table 1 and Figures 1 and 2, it can be concluded that chitosan and cellulose can predispose iron and zinc by the filtration column method. The optimal ratio of chitosan and cellulose for iron adsorption is 9:1 w/w, while the optimum ratio of chitosan and cellulose for zinc adsorption is 6:1 w/w. The above analysis data shows that the Fe metal content in used

oil has decreased after adsorption in S-2 and S-3 filter media.

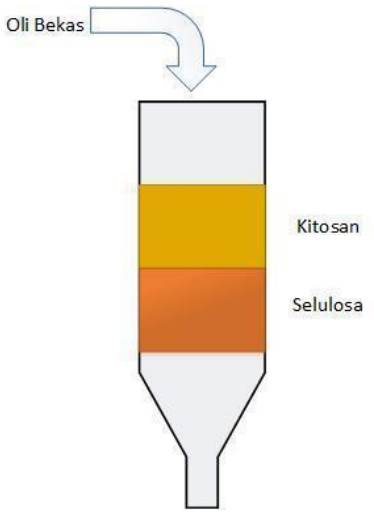

Figure 1. Diagram of the chitosan-cellulose filtration column *tool (center position for the image is only 1 line as in example figure 1, caption is more than 1 line, then justify indent as in example figure 2, times new roman typeface, font size 12, space 1)*

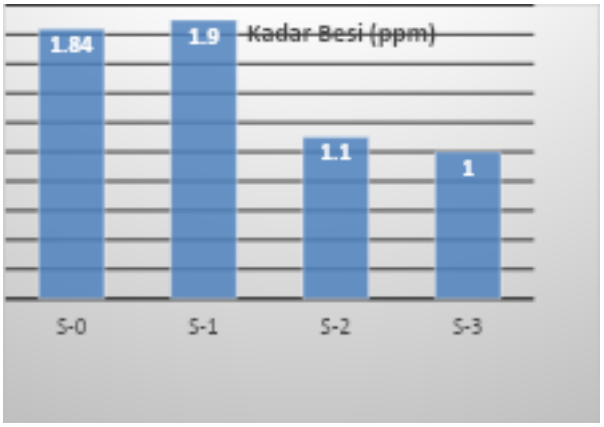

Figure 2. Graph of iron content to the variation of the chitosan:cellulose adsorbent comparison. S-0: no adsorbent (waste oil before filtration), S-1: ratio 3:1, S-2: ratio 6:1, S-3: ratio 9:1

Table 1. Data on the level and percentage of Zn metal reduction with variations in adsorbent weight ratio *(Examples of writing titles and presenting data with tables are as listed in the example of table title 1, times new roman typeface, font size 12, single space. Fill in the font size table 11).*

Sample Code	Comparison of Adsorbents (Chitosan:Cellulose)	Iron	
		Rate (ppm)	Percentage reduction (%)
S-0	0	1,84	0
S-1	3 : 1	1,90	-3,26
S-2	6 : 1	1,10	40,22
S-3	9 : 1	1,00	45,65

Used oil containing metal ions will be adsorbed to chitosan. The adsorption of chitosan on metal ions at low concentrations will tend to form metal ion chelate bonds with amine groups. According to Li Jin and Renbi Bai (2002), the active site in chitosan is played by the N atom of the amine group (-NH_2) and the O atom of the hydroxy group (-OH). The two atoms have free electrons that can bind protons or metal ions to form a complex. The interaction of free electron pairs on O atoms is stronger than the interaction of free electron pairs on N atoms so that N atoms tend to easily contribute free electron pairs from O atoms.

$$R\text{-}NH_2 + H+ \; R\text{-}\; NH_3 \qquad (1)$$

Reaction (1) shows the occurrence of protonation and deprotonation of amino groups in chitosan. When chitosan is added to a solution of metal ions, the following reactions are likely to occur:

$$R\text{-}\; NH_2 + Fe^{2+} \rightarrow R\text{-}NH_2Fe^{2+} \qquad (2)$$

$$R\text{-}\; NH^{3+} + Fe_2 + R^- \qquad NH_2Fe^{2+} + H^+ \qquad (3)$$

R is a component other than the –NH_2 group in chitosan.

CONCLUSION *(times new roman, font size 12, space 1.5)*

The writing format uses the Times New Roman typeface, font size 12, space 1.5. The conclusion must be presented in the manuscript and in line with the formulation of the problem and the purpose of the research/writing. The conclusion is written in one paragraph with reference to the purpose of the research and not written in the numbering.

ACKNOWLEDGMENTS (IF ANY) *(times new roman, font size 12, space 1.5)*

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BIBLIOGRAPHY(*times new roman, font size 12, space 1.5)*

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references, at least one article from a reputable analytical chemistry journal is cited to represent the analytical domain and strengthen the scientific foundation of the work. Namely :

Reference from the book : (name. (year). *Book title.* Edition. City. Publisher)

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