Characterization Methil Ester Sulfonate (MES) from Coconut Oil

Syamsuddin, Bambang Setiaji, Wega Trisunaryanti, Dan Harno Dwi Pranowo

Abstract: ***Characterization methyl ester sulfonate of coconut oil has been done. In this research the characterization of methyl ester sulfonat (MES) that were observed include the influence of the ratio of moles of reactant against MES, viscosity influence reaction time against MES, viscosity ratio of moles of a reactant influence against the density of MES and the influence of the reaction time toward the density of MES. The measurement is carried out using equipment viscometer Brookfield and Density Meter DMA 4500M. The results showed that the condition of the production process of methyl ester surfactant sulfonat shows that the best conditions reached a ratio of moles of reactant 1:1.4; at long reaction 4.5 hours, viscosity 30.42 cP and density 0.9866 g/cm^3.***

Keywords: Characterization, sulfonate (MES), DMA 4500M, Brookfield, ratio, reactant 1:1.4;

I. INTRODUCTION

Application of surfactant the latest and classified as an innovative effort is to apply a surfactant in EOR process in the petroleum industry. Until now, the existence of the sulfonation technological development allows MES became an important part in the formulation of detergents and other applications. Industrial development was further increased with the MES surfactants increase the availability of raw materials in the form of MES, methyl ester from oil as the largest component. To produce mes there is at least three rounds of important [2], which are (a) phase contact ME/ SO_3, (b) phase aging, and (c) phase in the neutralization. Sulfonation reactor, ratio mole SO_3 and alkyl controlled between 1,03: 1 to 1,06: 1 to achieve the conversion steady without causing the increase side reaction or degradation color [3]. During the process sulfonation held other products as anhidrid and sulfon also formed .Around 25 % sulfon and 75 % linear alkyl benzene (the lab) does not react with gas SO_3 can be removed during the aging and converted into the active ingredient [4]. Based on the case in this study will be carried out observations on the characterization of the products of methyl ester sulfonate (MES) obtained from previous research.

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Syamsuddin, Postgraduate Student, Department of Chemistry, Faculty of Mathematic and Natural Sciences, Gadjah Mada University, Sekip Utara, BLS Yogyakarta, Indonesia.

Bambang Setiaji b, Department of Chemistry, Faculty of Mathematic and Natural Sciences, Gadjah Mada University, Sekip Utara, BLS Yogyakarta, Indonesia.

Wega Trisunaryanti, Department of Chemistry, Faculty of Mathematic and Natural Sciences, Gadjah Mada University, Sekip Utara, BLS Yogyakarta, Indonesia.

Dan Harno Dwi Pranowo, Department of Chemistry, Faculty of Mathematic and Natural Sciences, Gadjah Mada University, Sekip Utara, BLS Yogyakarta, Indonesia.

II. MATERIALS AND METHODS

A. Materials

The materials used in this study is metil ester sulfonate (MES) from PT. Tropica Nucifera Industry Indonesia. The tools used in this study are as follows: viscometer Brookfield dan Density Meter DMA 4500M.

B. Methods

I. Measurement of Viscosity

Spindel plugged into viscometer, then lowered slowly so the spindel entered into the sample. Do not fill sample is excessive. Sample volume largely determine the calibration system. To obtain a sample that represents, the height of the liquid must be in line with the rod spindel on the line approximately 3.2 mm above the top of the tapered spindel. Viscometer Brookfield RV model, HA, HB run at 20 rpm, or to model LV at 12 rpm, and the reading of the results observed. If the results of the readings is located between number 2 and number 98 continued testing. Note the three readings every 60 seconds from each test temperature. Do the same procedure for each test temperature is desired. When the lowest temperature in the testing, the reading is still above 98 figures, spindel speed reduced and continued testing. If the reading is still above the number 98, use smaller spindel and repeated testing. The viscosity factor multiplied by the reading viscometer Brookfield viscosity in centipoise to get (cP). During the measurement of viscosity do not change the speed round of spindel as it will change the rate of shear

II. Measurement of Density

The tool is turned on and ensured the cells in conditions of measurements is clean and dry. Measurement of the temperature set at 70 ° c, and carried out the calibration. The solution to be tested are injected into the cell measurements and left for a few moments until temperature of 70^{o}C is reached, then pressed the button the measurement. Wait a few moments until the exit value and description is valid. The value that appears on the screen is recorded.

III. RESULTS AND DISCUSSION

A. Influence of the Ratio Moles Reactant Toward Viscosity of MES

The results of the analysis of sample viscosity surfactants MES after NaOH neutralised samples with a viscosity MES on the condition reaction (1:1.2 to 1:1.6) provides a range of 17.05 cP to 30.63 cP. The viscosity of surfactant samples lowest ratio occurred at MES mol (1:1, 2), namely of 17.05 cP. The highest viscosity occurs on the ratio of the reactants (1:1.4), that amounted to 30.05 cP. Charts of the ratio of the viscosity of surfactant MES mol $NaHSO_3$ toward viscosity seen in Figure 1.

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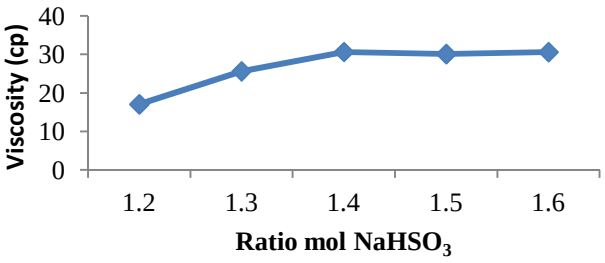

Figure 1. Influence Ratio Mole Reactans $NaHSO_3$ Toward Viscosity MES

Based on 1 figures showed that the ratio mole decreased $NaHSO_3$ added to the reactor and viscosity declining. Expected this is considering the concentration a reactant $NaHSO_3$ in to the reactor sulfonation become larger compared to an earlier condition as as a consequence there sulfonation excess to methyl ester, although saltpeter bound only on atoms alfa or atom c carbonyl without the double bond on a chain carbon. With no we the double bond on a chain of carbon from methyl ester from coconut oil, causing a spot sample liquid increased although not thick if me with a chain carbon many containing the double bond that look change in physical samples from liquid into more condensed shown the higher value viscosity. While increasing the ratio mole a reactant $NaHSO_3$ to pass through comparison mole ideal between methyl ester with a reactant $NaHSO_3$ causes molecules to SO_3 the more, so that the ability me to make bond with SO_3 the lower. Less a bond between the me to SO_3 occurring occurred when ideal balance between mole me to the moles a reactant $NaHSO_3$ so thick sample tending to stagnant or graph show a straight line cause to point liquid sample be constant resulting in the sample thick the unchanged at room temperature.The high viscosity because the style being debated between molecules that is liquid, chain molecule irregular and temperature so that a molecule into difficult move [5].

B. Influence of Reaction Time Toward Viscosity of MES

The results of the analysis of the viscosity of surfactant samples long treatment with MES reaction showed a tendency similar to the influence of the ratio of moles of reactants at which time average of (time 0-6 hours) sulfonation process goes gives a value of viscosity in the range 17.94 to 30.425 cP. The viscosity of surfactant samples lowest occurred on old MES reaction (3.5 hours), i.e. with the value of the highest viscosity 17.94 value 30.42 cP occurs at long reaction (4.5 hours). Charts viscosity surfactants MES from long time reaction to viscosity seen in Figure 2

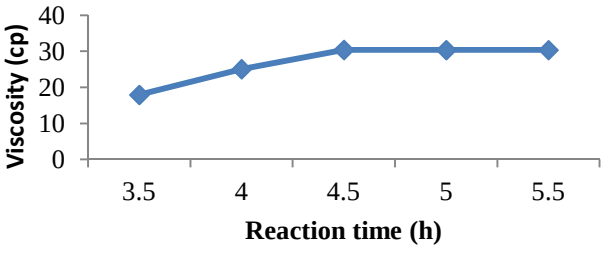

Figure 2. Influence of Reaction Time Toward Viscosity of MES

Based on figure 2 look that the process their lack of roots SO_3 to compounds me need the time 4.5 hours to become enlightened reaction so that a tendency the increase in thick sample in the form of value viscosity that there was an increase in significantly from 0 hours till 4.5 hours, after past the time 4.5 hours reaction so viscosity tended to be increased even declining. Expected this is considering the concentration a reactant $NaHSO_3$ in to the reactor sulfonation be balanced compared to an earlier condition as a consequence there sulfonation excess to methyl ester, although SO_3 bound only on atoms alfa or atom c carbonyl without the double bond on a chain carbon. With the double bond on a chain carbon, cause to point liquid sample increased although not thick if whose carbon chain contain many the double bond that look change in physical sample from a liquid into a more condensed shown the higher value viscous [5].

C. Influence of the ratio moles reactant toward density of MES

The analysis of density for a sample of MES measurable on the average between 0,970 g/cm^3 to 0,9860 g/cm^3. The density of the lowest is on ratios mole a reactant: 1,2 1 , then value of density increase in the ratio mole 1,3 and summit happened to the ratio 1,4 after passing the ratio 1,4 value of density likely to stay (stagnant). Charts the analysis influence the ratio mole a reactant against the density MES in the process of tested is presented in figure 3. The analysis shows that the ratio a reactant factors mole $NaHSO_3$ and long process sulfonation influences average MES density.

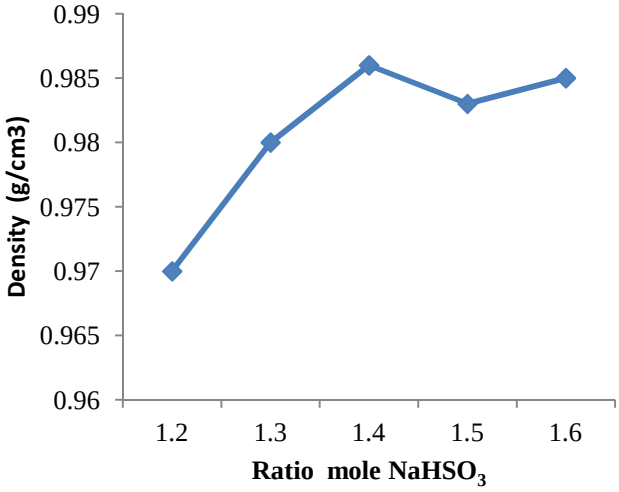

Figure 3. Influence Ratio Mole Reactan Toward Density MES

D. Influence of Reaction Time Toward Density of MES

The analysis of density MES result of measuring the density the average between 0,975 g /cm^3 to 0,986 g/cm^3. The lowest density was when reaction 3,5 hours, then the density of increased to on long reaction 4 hours and summit occurred at the reaction lasted 4,5 hours. After the intermission through the reaction 4,5 the density likely to stay (stagnant). Charts analysis MES whole density in the process of tested is presented in figure 4.

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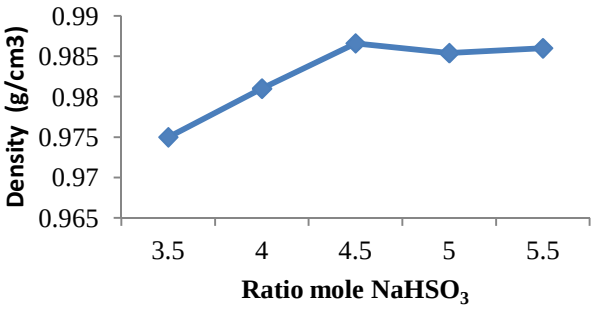

Figure 4. Influence Reaction Time Toward Density MES

The analysis shows that factors the ratio mole a reactant $NaHSO_3$ and long process sulfonation influential on the average the density of MES.

IV. CONCLUSIONS

Results of the study condition of production process of methyl ester sulfonate shows that the best conditions i.e the ratio of moles of reactant 1:1.4; at long reaction 4.5 hours. With viscosity 30.42 cP, and the density of 0.9866 g/cm^3.

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