

# Effect of Sodium Hydroxide (NaOH) in Bitumen Separation Process from Asbuton in Hot Water

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**Abstract** – Hot water process is one of methods to separate bitumen from asbuton. For increasing %recovery of bitumen, we can modify the hot water process by adding diesel oil, sodium hydroxida (NaOH) and Sodium Ligno Sulfonat (SLS) as surfactant. This research was foccusing on effect of the addition of NaOH concentration. This research used asbuton from Kabungka and carried out in two processes, digestion and sedimentation process. % recovery decreases with the increasing of NaOH concentration. The highest % recovery is 92% when ratio of diesel oil:asbuton 60:40, 0,5%wt SLS concentration, 30%wt SLS-NaOH solution from total solution and 1%wt NaOH concentration.

**Index Terms** –Hot water, asbuton, SLS, NaOH.

## INTRODUCTION

Asbuton is natural asphalt which is contained in rock in Buton Island. Asbuton utilization as alternative material for petroleum asphalt had not maximized yet due to lack of effectiveness in separation of bitumen in many researches before. There were two metods to separate bitumen from asbuton based on the method to separate oil from Utah and Athabasca tar sand, they were extraction with organic solvent and hot water. Extraction with organic solvent is not preferable due to less economical. Whereas Hot water process is more economical.

Hot water process was invented by Clark (1920) used for separating bitumen from Athabasca oil sand. This process can not be used completely in bitumen-asbuton separation caused by the differences of impurities with Athabasca oil sand. Athabasca oil sand had Silica (SiO<sub>2</sub>) impurities [1] and Asbuton contains calcium carbonate (CaCO<sub>3</sub>) [2] impurities. Because CaCO<sub>3</sub> have higher solubility in water than SiO<sub>2</sub>, it is necessary to modify hot water process. One of its modification was the addition of surfactant and NaOH. Surfactant has function to decrease surface tension between bitumen and its impurities and NaOH utilized as sealing agent, prevent bitumen to repatch on impurities [4].

From the previous research, the main problem was the less of (%) recovery obtained due to low concentration of NaOH added. Up until now, the highest NaOH concentration used was 0,05% wt. Meanwhile, Separation process bitumen from Utah tar sand was optimized in addition NaOH 0,58 M or about 2% wt concentration. The focus in this research was

studying the effect of concentration of NaOH added to %recovery of bitumen.

## MATERIALS AND METHODS

Asbuton from Kabungka, NaOH (1%, 2%, 3%wt), SLS (0,5%wt), Diesel oil : Asbuton (60:40), hot water, Chloroform.

### A. Content of Bitumen Analysis

300 gram asbuton was stored in oven at 105<sup>0</sup> C for 24 hours. Then soxhlet extraction (SNI 03-3640-1994 (BALITBANG-DINAS PU) was carried out to obtain the content of bitumen. After that calibration curve 1/ρ vs bitumen concentration was made.

### B. Digestion

Digestion process is carried out in a stirred cylindrical tank with 10,8 cm diameter and 20 cm height, which is equipped with a disc turbine stirrer and 4 baffles First step was started by mixing 300 gr asbuton with diesel oil: asbuton ratio 60:40 in stirred cylindrical tank in 250 rpm and 90<sup>0</sup>C temperature for 30 minutes. Then, it was added by surfactant 30%, 35% and 40% (surfactant solution:asbuton-diesel oil ) SLS-NaOH. The concentration of surfactan used was 0,5 (% wt) and for NaOH, 1%, 2% and 3% (% wt) was used. Digesting process was started after the solution of SLS-NaOH was added and it was stirred in 1500 rpm for 30 minutes.

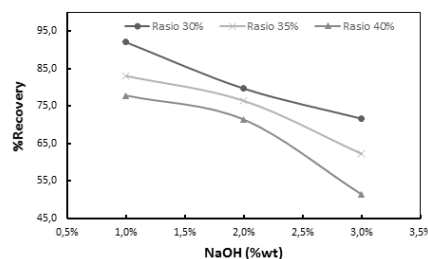
### C. Sedimentation and %recovery analysis

Sedimentation process was started by moved the mixture solution in beaker glass and it was added by 20%wt brine solution. After 24 hours sedimentation process, it form three layers. The top layer was bitumen solar solution. It was taken for measuring the density of it and (%) recovery was obtained

## RESULT AND DISCUSSION

### A. Effect of NaOH concentration

Figure 1 showed that increasing concentration of NaOH decrease (%)recovery of bitumen from asbuton

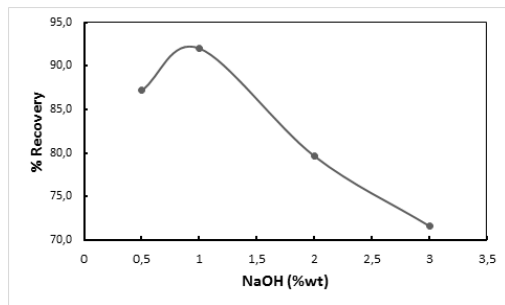


**Figure 1.** Effect of NaOH concentration at 0.5% wt SLS and diesel oil:asbuton 60:40 condition.

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### B. Optimum NaOH concentration

Figure 2 showed that optimum point at 1% wt NaOH and 92 (%)recovery was obtained



**Figure 2.** Effect of NaOH concentration at 0.5% wt SLS and diesel oil:asbuton 60:40 condition.

### CONCLUSION

Percent (%) recovery decreases with the increasing of NaOH concentration. The highest % recovery obtained in this study is 92% when the concentration of NaOH is 1% wt.

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