EXTRACTION OF PURE BITUMEN FROM ASBUTON BY MEANS OF EFFECTIVE AND EFFICIENT PROCESS

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ABSTRACT

The demand of asphalt in Indonesia, for road maintenance and construction of new roads, has kept increasing. However, the production capacity of the domestic oil refinery in Indonesia could meet merely 33% of the national demand, so that most of the required asphalt still has to be imported.

With fairly large natural reserve deposit, Asbuton – a popular name of rock asphalt from the Buton Island of Indonesia - is estimated to be able to fulfill all the need of asphalt in Indonesia for at least 100 years. However, the use of Asbuton in Indonesia was still very minimal, because the application of Asbuton for high-quality road pavement could not compete with that of petroleum asphalt, in term of price. The existence of dominant Asbuton minerals (i.e. mainly lime stone, silica, and etc.) is considered as the main problem, so that many experts believe that extraction of bitumen from the minerals is the main solution to obtain cheaper cost. The effective and efficient process of bitumen extraction, to obtain production cost bitumen comparable with that of petroleum bitumen, is however not yet known in Indonesia, so that this research was performed as an effort to address to above problem.

In this research, extraction of pure bitumen was performed for the common Asbuton available in the market, the type of BGA B20 (bitumen content of 20%), with kerosene as the fluxing agent. The kerosene was selected after many trials conducted previously using gasoline and diesel oil. This research was a laboratory experimental one. In the extraction process, the ratio between Asbuton and kerosene was varied to obtain the coefficient of mass transfer inside the solution, while in the filtration process the efficiency of separation process between the solid part and the liquid part of the solution was determined. Afterwards, the process of distillation was performed to separate kerosene from bitumen-kerosene solution, so that the kerosene could be recycled as much as possible to be used in further process.

From this experiment, an empirical correlation is obtained that the mass transfer coefficient ($k_L$) in the extracted Asbuton is a function of the increase in
rotational speed of stirrer (Np), the reduction Asbuton particle size (Db), and the increase of ratio of mixture in solution (Rp). Separation between liquid solution and the solid mineral part was performed using centrifugal filter system, in which the process has resulted fairly high efficiency, so that the total kerosene lost was merely between 3 to 4%, while almost 100% of pure bitumen was extracted. During the process of distillation, pure bitumen was extracted and at least 96% of the kerosene was recaptured to be used for further processes. From this process, the cost of bitumen production can be estimated, and it was found to be comparable, or slightly lower, than the cost of petroleum asphalt, depending mainly on the amount of bitumen could be recaptured from the process to be reused on the next processes.

**Keywords:** bitumen extraction, rock-asphalt, Asbuton, asphalt technology, cost of bitumen process.