MAKING NITROCELLULOSE FROM COTTON (Gossypium sp.) AND KAPOK (Ceiba pentandra) USING NITRATION REACTION

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ABSTRACT

The utilization of the cotton and kapok are limited in use, such as it used as an ingredient of cosmetics, bedding material, mattress, and used in various textile industries. Along with the development of technologies that exist today, utilization of cotton and kapok began to frequent abandoned, for example its use as bedding material are now widely used material from dacorn that more comfortable, and the development of many synthetic fabrics that used in textile industry. Therefore, it is important to consider reuse of cotton and kapok that has a higher use value and economic value because of the national production of cotton and kapok is very large, including the conduct of research and the cotton gin to nitrocellulose by using cellulose content of cotton and kapok are quite great.

The first purpose of this research is to determine the influence of cellulosic feedstock in the produce of nitrocellulose from cotton and kapok cellulose materials with the nitrination reaction, the second purpose is to studying the effect of reaction time, reaction temperature, and acid composition on the quality of the resulting nitrocellulose, and the third is to compare the quality of the nitrocellulose produced from cotton cellulose and from kapok cellulose.
The research was carried out by following steps, the first is do the weighing of cellulose materials from cotton and kapok as much as 5 grams, the next step is preparing the 65% HNO₃, H₂SO₄ 98%, and aqueous NaHCO₃ and so aquadest. The next step is the reaction of HNO₃ with H₂SO₄, HNO₃ solution is reacted with a variable that is adjusted to 30 mL, 45 mL and 60 mL, whereas H₂SO₄ used was 60 mL. Further the conditions of the reactor is conditioned in the variable temperature 5°C, 15°C, and 25°C by compressing in a ice bath because this reaction is exothermic reaction. If the reactor temperature has reached, the next step, enter the cotton or kapok into the reactor and performed with variable immersion, which is 30 minutes, 45 minutes, and 60 minutes. And the final step is washed with aquadest and solution of NaHCO₃. Then be measured through the quality of solubility and FTIR (Fourier Transform Infra Red) test.

Conclusions can be drawn from this study is the raw material of cotton cellulose % nitrocellulose product ratio is greater than compared with the % ratio of raw materials produced by the kapok cellulose, % nitrocellulose product from cotton is 20-50%, and from kapok is 6-30%. The long time for the reaction time making ratio nitrocellulose, the greater % ratio of nitrocellulose products formed, the greater the reaction temperature of the %ratio of nitrocellulose products formed smaller, the more volume of nitric acid is added, the greater %ratio of nitrocellulose products formed. For producing nitro group at the most, with cotton is needed 30 minutes, temperature 15°C, and composition of the acid mixture H₂SO₄ 60 mL and HNO₃ 45 mL, and with kapok is needed 60 minutes, temperature 5°C, and composition of the acid mixture H₂SO₄ 60 mL and HNO₃ 30 mL.

Key words: the nitration reaction, cellulose, nitrocellulose, cotton, kapok