

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusions

1. Saponification of latex and washing followed by coagulation

In this work, purification of natural rubber latex by saponification is successful as the new method to produce highly purified natural rubber.

The appropriate conditions for the saponification of natural rubber latex are as follow, 5%(w/v) NaOH, 0.2% Triton X-100 at 70^o C for 3 h followed by centrifugation.

Nonionic surfactant, Triton X-100 was found to give latex the stability higher than of SDS, anionic surfactant. Double centrifugation is more effective than single centrifugation by 4-5 times for protein removal.

The low nitrogen content of 0.02% level can be obtained by saponification of fresh/field natural rubber latex with more than 4% NaOH. Gel and ester content of saponified rubber are 1-2% and 9-10 ester group/rubber chain, respectively.

Molecular weight of natural rubber after saponification reduced to about 2/3 of fresh/field natural rubber.

2. Saponification of latex and coagulation followed by washing

By method of direct coagulation with NaCl, Ca(NO₃)₂ and H₂SO₄, fine crumb can be obtained by coagulation with H₂SO₄ in the presence of sodium stearate. Low nitrogen content (< 0.02%) and low ash content (<0.5%) of saponified rubber can be obtained by neutralization with H₂SO₄ at pH 8 in the presence of sodium stearate. This method can be applied to large-scale production like synthetic rubber process.

3. Effect of antioxidant on thermal oxidative aging of DPNR

By addition of synthetic antioxidant to saponified and washed DPNR, it shows high ability to prevent the thermal oxidative of DPNR. P₀ and PRI of DPNR shows

that DPNR is softer than original rubber and DPNR retard to thermal oxidation as same as original rubber.

4. Green properties of DPNR

Tensile stress-strain curve of natural rubber shows that modulus of DPNR decreases significantly after saponification. P_0 and PRI also evidence the lower mechanical properties of DPNR. It is due to the structural change of rubber molecule. Rubber molecule converts to linear molecule after saponification.

5.2 Suggestions for Future Work

It is some suggestions for the future work for deproteinization by saponification are

- a) Using more severe conditions such as high reaction temperature, long reaction time in order to cleave ester linkage and produced linear molecule natural rubber.
- b) Using various kinds of surfactant to study the effect of HLB on stability of latex during saponification and washing process.
- c) Using the other type of alkali such as potassium hydroxide, which may be more effective to decompose protein.
- d) Using the other types of coagulant and suspending agent in order to obtain very fine crumb with extremely low nitrogen content and low ash content.