

CHAPTER V

SUMMARY

1. Deproteinization by saponification has been optimized for both of fresh latex and solid crumb rubber, prepared from ammoniated latex crumb and skim crumb respectively.

1.1 Saponification of fresh latex

Fresh latex is adjusted to 30%DRC in suitable amount of 0.15 p.h.r hydroxylamine hydrochloride, 0.05 p.h.r sodium metabisulfite and 0.1%v/v antioxidant. Saponification is 5% w/v of KOH at 70 °C for 3 hours. The saponified latex is then diluted to 10 %DRC and coagulated in 1% formic acid. The coagulum is washed, creped and dried at 60 °C.

1.2 Saponification of ammoniated crumb rubber and skim crumb rubber

Ammoniated latex is preserved with 0.3% ammonia and 0.025% TMTD/ZnO stabilized system. Before use, it is diluted to 15 %DRC with water and stabilizer chemical additives. The latex is coagulated in 1% formic acid, followed by washing and shredding. Five batches of 1-2 kg ammoniated crumb rubber are saponified in a 10-L batch of 5%w/v KOH at 70 °C for 3 hours. Each batch of saponified ammoniated rubber is washed, shredded into small pieces and dried at 60-120 °C, 10 hours.

Skim latex is warmed at 50 °C for 2-3 hours to evaporate ammonia before adding chemical additives and coagulated by adding concentrated sulfuric acid about 1%. The coagulum is washed and shredded. Five batches 1-2 kg skim crumb rubber is saponified in a 10 L batch of 5%w/v KOH at 70 °C for 3 hours, yielding saponified skim rubber (SAP-SK) of 0.1 % nitrogen content.

2. The % nitrogen of saponified latex, saponified ammoniated crumb and saponified skim crumb are 0.58 %, 0.21% and 0.10 % respectively.

3. Saponification of solid crumb rubber more advantages than latex in its cost and lowers the amount of non-rubber impurities. The cost of SAP-L, SAP-AL and SAP-SK are 54 Baht/kg, 33 Baht/kg and 25 Baht/kg.

4. Saponification of ammoniated crumb, skim crumb especially latex resulting in increase ash content.

5. Saponification of crumb rubber improve in purity, that the gel content in SAP-AL was reduced from 5% to 4% whereas SAP-SK was drastic increased the gel content from 33% to 3-4% after saponification. Furthermore, SAP-AL and SAP-SK decreased in fatty acid ester that acetone soluble content was decreased about 7% and 40 % respectively.
6. Molecular characteristics of skim crumb rubber resulting in decreasing of molecular weight and number average and show very small molecule. While the molecular characteristics of saponified ammoniated crumb show a slightly decrease in the \bar{M}_w and \bar{M}_n after saponification.
7. Cure characteristic of SAP-NR in this standard resulting in slightly in crease in the cure rate of SAP-SK whereas the cure rate of SAP-AL slightly decreases.
7. The typical characteristics of both SAP-NR vulcanize are their slightly lower in 300% elongation was comparing t non-saponified rubbers.
8. Proteins of 45 kD and protein lower molecular weight than 14.2 kD that persisted in saponified crumb rubber are not allergen.
9. There are no allergenic response to saponified crumb rubber detected by EAST test and Skin prick test.
10. The prevalence of latex protein allergen in 100 Thai healthy blood donor investigated by EAST is 5%, in general patients is 8.3% and in atopic health care worker is 66%.