

## CHAPTER VI

### CONCLUSIONS

1. Deproteinized rubber can be prepared by enzyme treatment as follows:

Fresh field latex is preserved with 25% ammonia and 1.15 p.h.r of Triton X-100, diluted to 25% DRC, added chemical and adjusted to optimal pH range. The latex is digested with enzyme at optimal reaction time and temperature. The deproteinized rubber is coagulated with steam in an autoclave for 15 min and the coagulum is then washed, creped and dried at 60°C.

The optimum conditions for CV-DPNR production from fresh latex by Alcalase and Papain are:

Latex	:	fresh latex	
Chemicals	:	sodium metabisulfite	0.05 p.h.r.
		hydroxylamine hydrochloride	0.15 p.h.r.
		Triton X-100	1.15 p.h.r.
		Papain	0.3 p.h.r. or
		Alcalase	0.4 p.h.r.
operating conditions	:	pH 7.6, agitation speed 60 r.p.m	
		50°C, reaction time 1 h.	for Papain
		60°C, reaction time 4 h.	for Alcalase
steam coagulation	:	15 min under 15 lb/in <sup>2</sup> at 121°C	

2. The suitable agitation speed 60 rpm by using an agitated tank is reported:

At optimum turbulence intensity factor of 50-58, the maximum reduction of nitrogen content is about 84 % for Papain and about 72% for Alcalase. For high turbulence intensity factor or high Reynolds number, high energy obtained is removed by collision and vibration resulting in reduction of the nitrogen content in resulting rubber. The removal of protein will be decreased due to rubber particle in latex may

be conglomerated. At low intensity factor or Reynolds number, energy gained from agitation is not enough to diffuse enzyme into latex.

3. Mooney viscosity of CV-DPNR is lower than its control CV-NR. The Mooney viscosity of CV-NR prepared from three rubber clones increases with the rate of 1-2 Mooney units per month except, when prepared at agitation speed 75 rpm that the rate of storage hardening decreased about half compared with at agitation speed 0 rpm. CV-DPNR from clone RRIM 600 has the lowest rate of increasing Mooney viscosity followed by GT 1 and PB 5/51 respectively. (0.18, 1.49 and 1.86 Mooney unit per month) when prepared at agitation speed 60 rpm due to removal of protein. The different sizes of rubber particles in each rubber clone may encourage for requirement of different optimal agitation speeds to obtain minimum storage hardening for each rubber clone.

4. Papain-treated rubber has more advantage over Alcalase-treated rubber because it requires less reaction time and the CV-DPNR prepared by using Papain yield the higher quality of raw rubber with lower nitrogen content. The vulcanizate properties of Papain-treated DPNR is better due to its high tensile strength and light color.

5. For cure characteristics CV-DPNR from clone RRIM 600 has more advantage with increasing scorch time and torque rise, with reducing cure time and cure rate. The cure time and cure rate of Papain-treated rubber are less than Alcalase-treated rubber while higher 300% modulus and torque rise although slightly shorter scorch time.

6. Deproteinization result in a superior vulcanizate properties with decreases in hardness and 300% modulus, whereas the tensile strength, tear strength and % elongation at break of CV-DPNR are all increased.