

CHAPTER V

CONCLUSIONS

1. The suitable conditions for papain immobilization on chitin.

By physical adsorption, one gram of chitin, 10 - 40 mesh, was reacted with papain solution which was prepared to have specific activity about 12,300 units in phosphate-cysteine-EDTA buffer pH 6.0 for 15 min and then mixed with glutaraldehyde (stock 0.7 % (w/v)) to the final concentration of 1.75% (w/v). After 45 min of the reaction, the immobilized papain was washed 4 times with water. The activity of immobilized papain (PIP) at 65-70 CDU/g chitin and 1.67 % yield can be obtained.

By covalent-binding method, one gram of chitin was reacted with 1%(w/v) of the final concentration of glutaraldehyde (stock 0.4% (w/v)) in phosphate buffer pH 8.0 for 30 min and excess glutaraldehyde was removed by 2 time-washing. Papain solution which was prepared to have specific activity about 12,800 units in phosphate-sodium bisulfite-EDTA buffer pH 8.0 before addition into glutaraldehyde-treated chitin. After 45 min of the reaction, the immobilized papain was washed 4 times with water. The activity of immobilized papain (CIP) at 450-470 CDU/g chitin and 23.00 % yield can be obtained.

2. Both types of immobilized papain differ from free papain with respect to their pH and temperature optimum, pH and temperature stability and kinetics properties. Covalently-immobilized papain (CIP) was chosen for the application, latex deproteinization, due to

its highest activity, specific activity, yield, storage stability.

3. The optimal condition for deproteinization of fresh field latex by covalently immobilized papain was :

Latex	:	fresh field latex	20 % DRC	
Chemicals	:	hydroxylamine hydrochloride	0.15	p.h.r.
		sodium metabisulfite	0.05	p.h.r.
		Triton X-100	1.2	p.h.r.
		thiourea	0.0023	p.h.r.
		immobilized papain	20	p.h.r.

Operating condition : pH 7-8, 40°C, speed of shaking 120 rpm and reaction time 3 hours.

Steam coagulation : 15 min under 15 lb/in² at 121 °C.

4. The reduction of nitrogen content is maximum about 80-84 % and 70% for the second used of immobilized papain. The DPNR produced from fresh field latex by immobilized papain has no affect on MWD and is acceptable regarding its raw rubber properties except dirt and ash content.

5. DPNR produced by immobilized papain showed shorter scorch time, cure time and cure rate comparing to the control, non deproteinized rubber, where the torque rise increased to higher level.

6. DPNR produced by immobilized papain showed improvement in dynamic properties. The reduction of proteins increased the tensile strength, % elongation at break of vulcanized rubber but decreased hardness.

Effect of the heat-ageing (70 °C, 7 days) on hardness, 300 % modulus and % elongation at break of DPNR are less than the control, non-deproteinized rubber, especially 300% modulus.



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