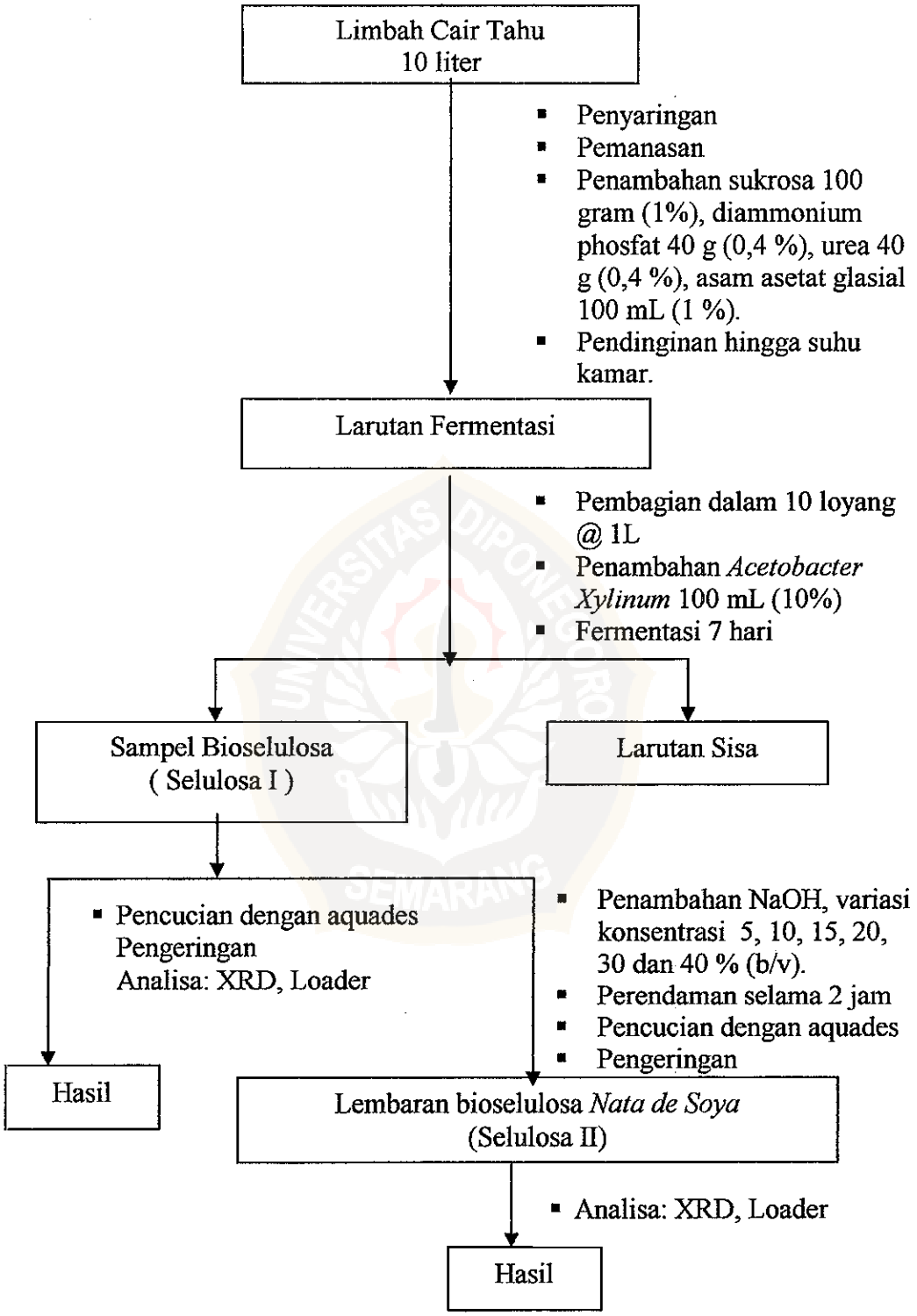
Lampiran 1. Skema Kerja



Lampiran 2. Hasil Analisa XRD dengan merserisasi NaOH 0%

*** Basic Data Process ***

Group Name : Data sampel
Data Name : Endang N
File Name : Endang N.PKR
Sample Name : Nata desoya 10%
Comment : Nata de soya 0% NaOH

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	8	23.5400	3.77629	100	1.42000	80	6108
2	7	21.2600	4.17584	36	1.10660	29	1936
3	5	15.7300	5.62922	10	0.70000	8	473

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	6.0800	14.52489	3	0.04000	2	8
2	9.6200	9.18645	8	0.76000	6	334
3	12.1500	7.27864	8	0.62000	6	285
4	14.2500	6.21037	8	0.38000	6	274
5	15.7300	5.62922	10	0.70000	8	473
6	17.9900	4.92682	6	0.10000	5	74
7	21.2600	4.17584	36	1.10660	29	1936
8	23.5400	3.77629	100	1.42000	80	6108
9	28.4000	3.14014	3	0.04000	2	12
10	29.4400	3.03154	3	0.32000	2	48

Lampiran 3. Hasil Analisa XRD dengan merserisasi NaOH 15%

*** Basic Data Process ***

Group Name : Standard
Data Name : Undip Endang-3
File Name : Undip Endang-3.PKR
Sample Name : 15% NaOH
Comment : Nata de soya 10 %

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	4	22.8835	3.88312	100	1.74050	1887	163791
2	1	14.5788	6.07104	47	2.29110	882	105509
3	3	20.9200	4.24293	29	2.13340	539	66598

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	14.5788	6.07104	47	2.29110	882	105509
2	16.9400	5.22976	17	1.63000	316	30367
3	20.9200	4.24293	29	2.13340	539	66598
4	22.8835	3.88312	100	1.74050	1887	163791

Lampiran 4. Hasil Analisa XRD dengan merserisasi NaOH 20%

*** Basic Data Process ***

Group Name : Standard
Data Name : Undip Endang-2
File Name : Undip Endang-2.PKR
Sample Name : 20%NaOH
Comment : Nata de soya 10%

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	4	22.7230	3.91018	100	1.75640	2053	181349
2	1	14.4325	6.13225	42	2.19500	863	96197
3	3	20.6800	4.29163	33	1.97200	679	75427

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	14.4325	6.13225	42	2.19500	863	96197
2	16.8200	5.26680	18	1.66000	365	34772
3	20.6800	4.29163	33	1.97200	679	75427
4	22.7230	3.91018	100	1.75640	2053	181349

Lampiran 5. Perhitungan Perubahan Kristalinitas

Prinsip dari penentuan perubahan kristalinitas didasarkan pada luasan dibawah kurva. Perubahan kristalinitas dihitung dengan rumus:

$$\text{Perubahan kristalinitas} = \frac{\sum \text{Luas area } 2\theta \text{ pada } 5 - 30 \text{ sampel}}{\sum \text{Luas area } 2\theta \text{ pada } 5 - 30 \text{ standard}} \times 100\%$$

$$= \frac{\sum \text{Luas area pada } 2\theta\ (\ 5 - 30\ ) \text{ sampel setelah merserisasi}}{\sum \text{Luas area pada } 2\theta\ (\ 5 - 30\ ) \text{ sampel tanpa merserisasi}} \times 100\%$$

$$= \frac{\Sigma(\text{Intensity} \times \text{FWHM}) \text{ sampel setelah merserisasi}}{\Sigma(\text{Intensity} \times \text{FWHM}) \text{ sampel tanpa merserisasi}} \times 100\%$$

**FWHM = Full Width at Half Maximum*

Perhitungan berdasarkan dari data hasil analisa XRD pada lampiran 5, 6 dan 7.

1. Perhitungan Luas area pada 2θ (5 -30) sampel tanpa merserisasi:

= (2 x 0,04) + (6 x 0,76) + (6 x 0,62) + (6 x 0,38) + (8 x 0,7) + (5 x 0,1) + (29 x 1,1066) + (80 x 1,42) + (2 x 0,04) + (2 x 0,32)

= 0,08 + 4,56 + 3,72 + 2,28 + 5,6 + 0,5 + 32,0914 + 113,6 + 0,08 + 0,64

= 163,0914

2. Perubahan kristalinitas sampel dengan merserisasi NaOH 15%

Σ Luas area 2θ pada 5 – 30 sampel = (882 x 2,2911) + (316 x 1,63) + (539 x 2,1334) + (1887 x 1,7405)

= 2020,7502 + 515,08 + 1149,9026 + 3284,3235

= 6970,0563

$$\text{Perubahan kristalinitas} = \frac{6970{,}0563}{163.0914} \times 100\%$$

$$= 42{,}7371 \text{ x } 100\%$$

3. Perubahan kristalinitas sampel dengan merserisasi NaOH 20%

Σ Luas area 2θ pada 5 – 30 sampel = (863 x 2,195) + (365 x 1,66) + (679 x 1,972) + (2053 x 1,7564)

$$= 1894{,}285 + 605{,}9 + 1338{,}988 + 3605{,}8892$$

$$= 7445{,}0622$$

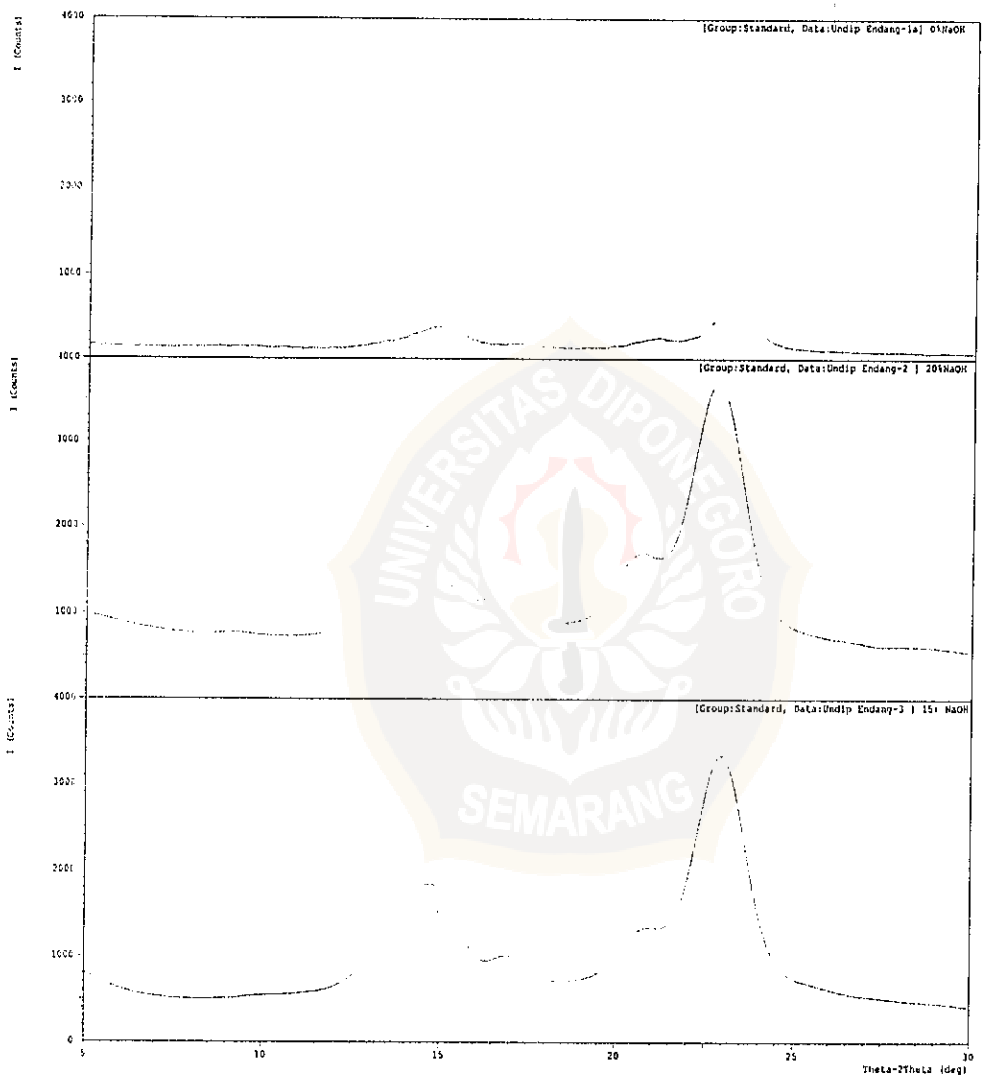
$$\text{Perubahan kristalinitas} = \frac{7445{,}0622}{163{,}0914} \times 100\%$$

$$= 45{,}6496 \text{ x } 100\%$$

Lampiran 6. Spektra Analisa XRD

*** Multi Plot ***

File Name : Standard\Undip Endang-1a
Sample Name : 0%NaOH Comment : Nata de soya 10%
Date & Time : 11-23-02 09:42:17
Condition
  X-ray Tube : Cu(1.54060 A) Voltage : 40.0 kV Current : 30.0 mA
  Scan Range : 2.0000 <-> 30.0000 deg Step Size : 0.0200 deg
  Count Time : 0.12 sec Slit DS : 0.50 deg SS : 1.00 deg RS : 0.30 mm

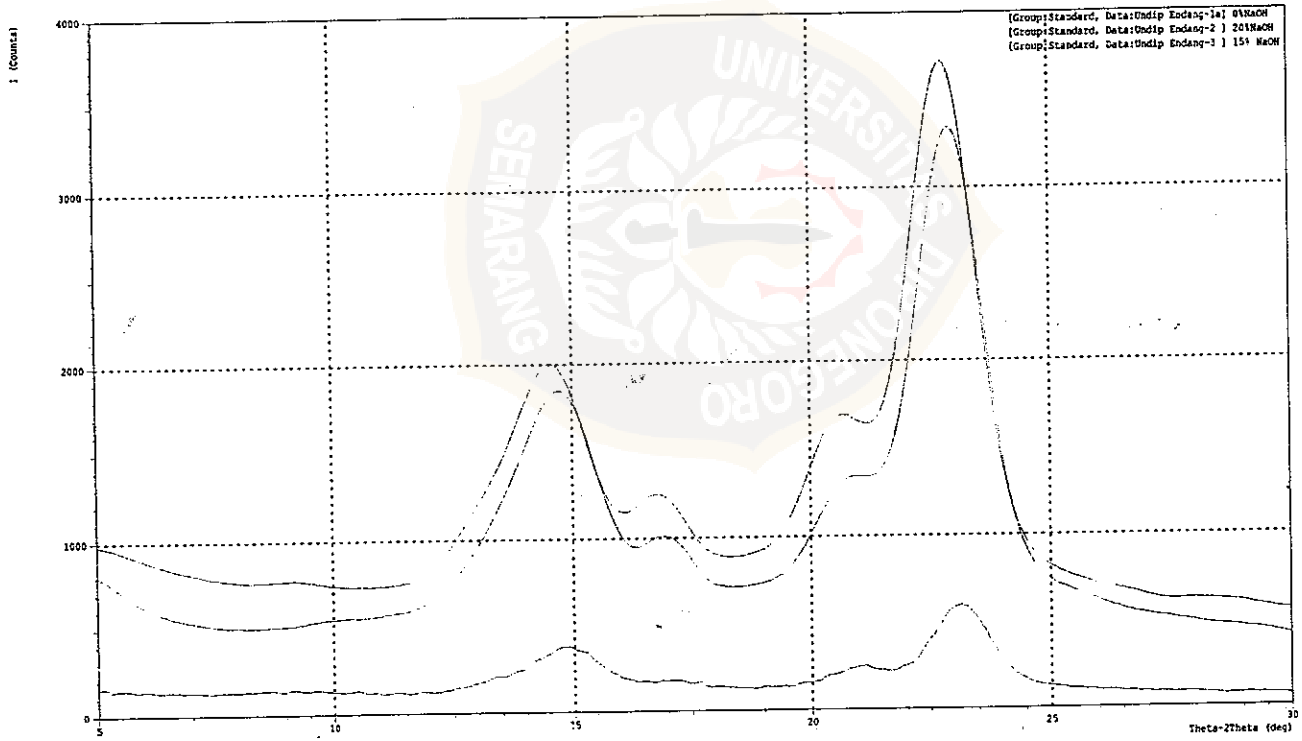


Standard\Undip Endang-1a	0%NaOH	Cont.Scan 10.0 deg/min 0.12 sec
Standard\Undip Endang-2	20%NaOH	Cont.Scan 4.0 deg/min 0.30 sec 0
Standard\Undip Endang-3	15% NaOH	Cont.Scan 4.0 deg/min 0.30 sec 0

Lampiran 7. Gabungan Spektra Analisa XRD

*** Multi Plot ***

File Name : Standard\Undip Endang-1a
Sample Name : 0%NaOH Comment : Nata de soya 10%
Date & Time : 11-23-02 09:42:17
Condition
X-ray Tube : Cu(1.54060 A) Voltage : 40.0 kV Current : 30.0 mA
Scan Range : 2.0000 <-> 30.0000 deg Step Size : 0.0200 deg
Count Time : 0.12 sec Slit DS : 0.50 deg SS : 1.00 deg RS : 0.30 mm



Lampiran 8. Perhitungan Kekuatan Regang (*tensile strength*)

Diketahui : L = Luas sampel = 2 x 4 cm^2 = 8 cm^2 = 8. 10^{-4} m^2

g = Percepatan gravitasi = 9.807 ms^{-2}

M = Massa yang digunakan untuk menarik sampel, Kg

M_1= 1,52 Kg (untuk sampel tanpa merserisasi)

M_2= 1,62 Kg (untuk sampel setelah merserisasi NaOH 5%)

M_3= 1,80 Kg (untuk sampel setelah merserisasi NaOH 10%)

M_4= 2,18 Kg (untuk sampel setelah merserisasi NaOH 15%)

M_5= 2,90 Kg (untuk sampel setelah merserisasi NaOH 20%)

Rumus :

$$\sigma = \frac{F}{L}$$

$$\sigma = \frac{M \times g}{L}$$

Keterangan : σ = Kekuatan regang (*tensile strength*), Pascal (Pa)

F = Gaya, Newton (N)

L = Luas, m^2

M = Massa, Kg

g = percepatan gravitasi = 9.807 ms^{-2}

Contoh

1. Perhitungan Kekuatan regang untuk sampel tanpa merserisasi

$$\sigma = \frac{M_1 \times g}{L}$$

$$= \frac{1{,}52 \text{ kg} \times 9{,}807 \text{ ms}^{-2}}{8 \times 10^{-4} \text{ m}^2}$$

$$= 18633{,}3 \text{ Pa}$$

$$= 18.633 \text{ KPa}$$

2. Perhitungan Kekuatan regang sampel setelah merserisasi NaOH 5%

$$\sigma = \frac{M_2 \times g}{L}$$

$$= \frac{1{,}62 \text{ kg} \times 9{,}807 \text{ ms}^{-2}}{8 \times 10^{-4} \text{ m}^2}$$

$$= 19859 \text{ Pa}$$

$$= 19{,}859 \text{ KPa}$$

3. Perhitungan Kekuatan regang sampel setelah merserisasi NaOH 30%

Diketahui: L = Luas sampel = 7 x 32 mm^2 = 224 mm^2 = 2,24 x 10^{-4} m^2

M_6 = Massa = 16,75 Kg

Perhitungan:

$$\sigma = \frac{M_6 \times g}{L}$$

$$= \frac{16{,}75 \text{ kg} \times 9{,}807 \text{ ms}^{-2}}{2{,}24 \times 10^{-4} \text{ m}^2}$$

$$= 733335{,}937 \text{ Pa}$$

= 733,34 KPa

7. Perhitungan Kekuatan regang sampel setelah merserisasi NaOH 30%

Diketahui: L = Luas sampel = 7 x 29 mm^2 = 203 mm^2 = 2,03 x 10^{-4} m^2

M_6 = Massa = 25 Kg

Perhitungan:

$$\sigma = \frac{M_7 \times g}{L}$$

$$= \frac{25\ kg \times 9{,}807\ ms^{-2}}{2{,}03 \times 10^{-4}\ m^2}$$

= 1207758,6 Pa

= 1207,758 KPa

= 1,208 MPa

Lampiran 10. Hasil Analisa Kekuatan Regang

LABORATORIUM FISIKA ZAT PADAT
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS GADJAH MADA YOGYAKARTA

Data Hasil Pengukuran Tensile (Kekuatan Regangan)

Tanggal Pengukuran : 16 Pebruari 2003

Alat yang dipakai : Loader (bagian dari unit Photoelastic Experiment Apparatus Set)

No	Sampel 1 0 %	Sampel 2 5 %	Sampel 3 10 %	Sampel 4 15 %	Sampel 5 20 %
1	1,8 kg	1,7 kg	1,9 kg	2,0 kg	3,0 kg
2	1,2 kg	1,7 kg	1,8 kg	2,5 kg	2,9 kg
3	1,5 kg	1,6 kg	1,8 kg	1,9 kg	2,5 kg
4	1,6 kg	1,6 kg	1,7 kg	2,5 kg	2,9 kg
5	1,5 kg	1,5 kg	1,8 kg	2,0 kg	3,2 kg
Rerata	**1,52 kg**	**1,62 kg**	**1,8 kg**	**2,18 kg**	**2,9 kg**

Yogyakarta, 28 Pebruari 2003

Mengetahui Ka. Lab.

Dr. H. Sumartono Prawirosusanto

Petugas Lab.

Widyastuti