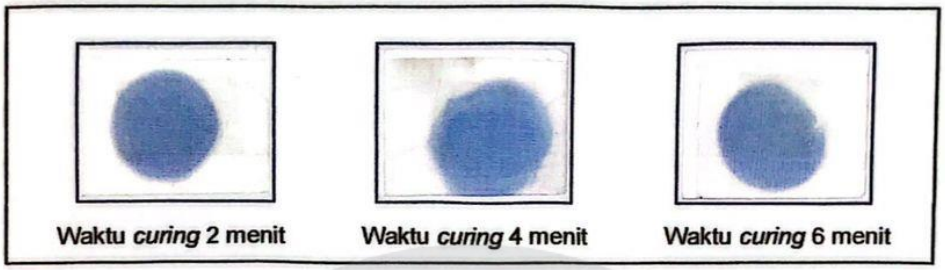
LAMPIRAN

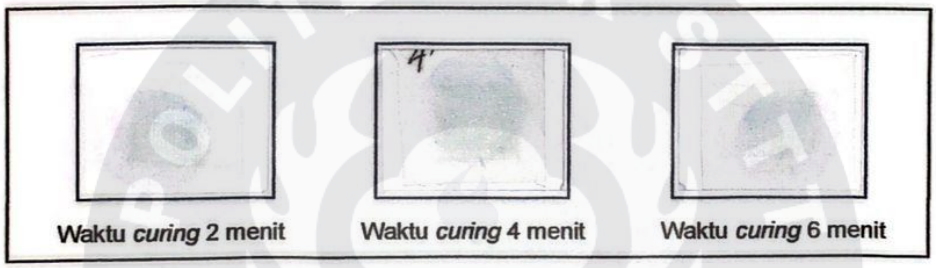
Lampiran 1 Kain Hasil Evaluasi Pengujian Ketahanan Luntur Warna Terhadap Gosokan

1. Variasi binder 100 gram pengujian gosok basah



Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

2. Variasi binder 100 gram pengujian gosok kering

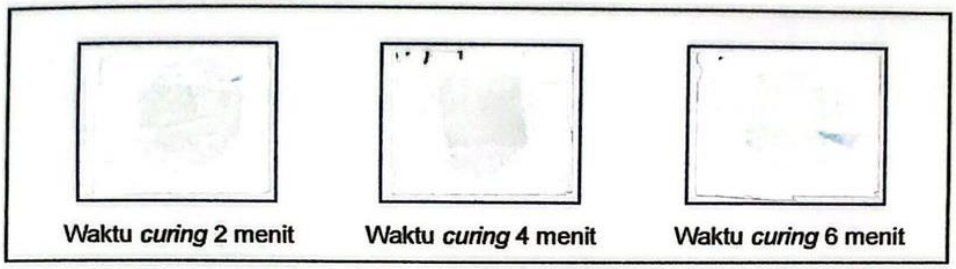


Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

3. Variasi binder 150 gram pengujian gosok basah

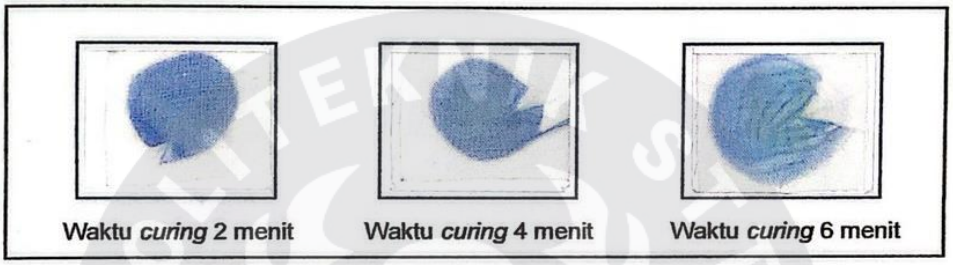
Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

4. Variasi binder 150 gram pengujian gosok kering



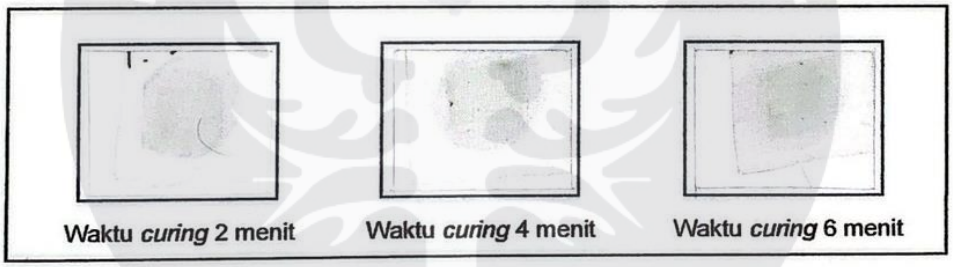
Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

5. Variasi binder 200 gram pengujian gosok basah



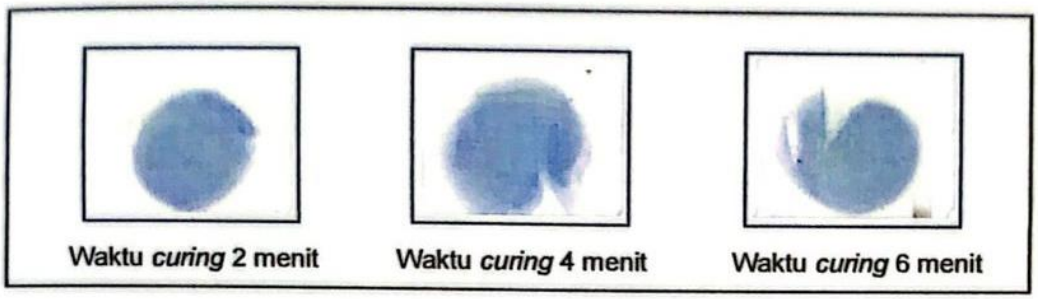
Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

6. Variasi binder 200 gram pengujian gosok kering



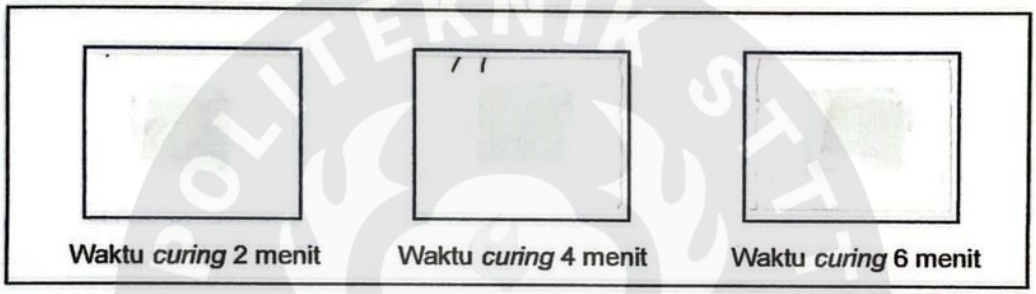
Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

7. Variasi binder 250 gram pengujian gosok basah



Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

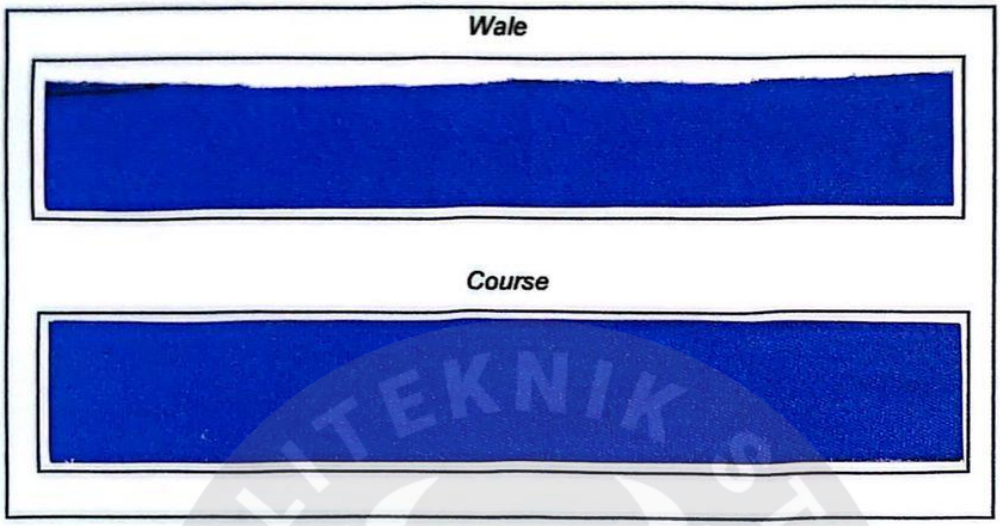
8. Variasi binder 250 gram pengujian gosok kering



Waktu *curing* 2 menit | Waktu *curing* 4 menit | Waktu *curing* 6 menit

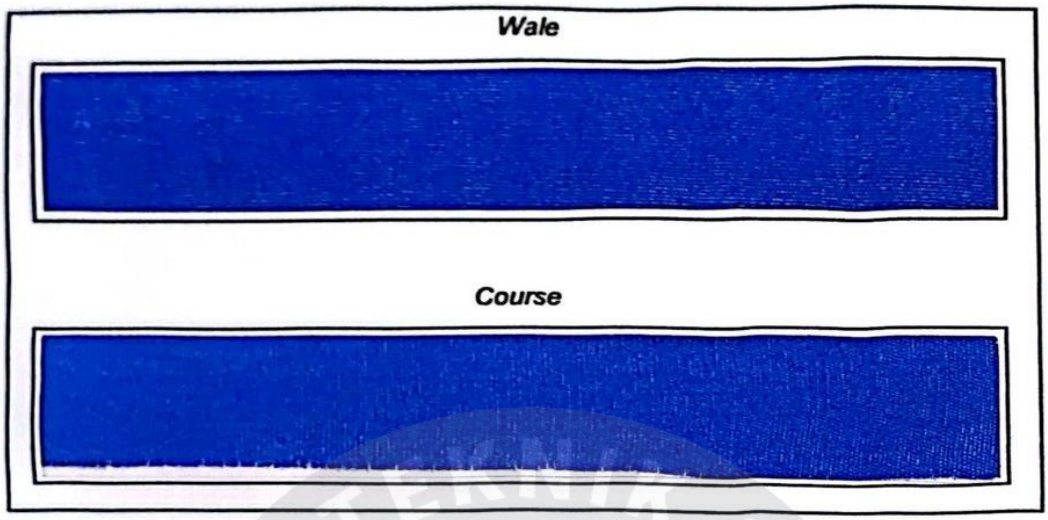
Lampiran 2 Kain Hasil Evaluasi Pengujian Kekakuan Kain

1. Variasi 100 gram dan waktu *curing* 2 menit

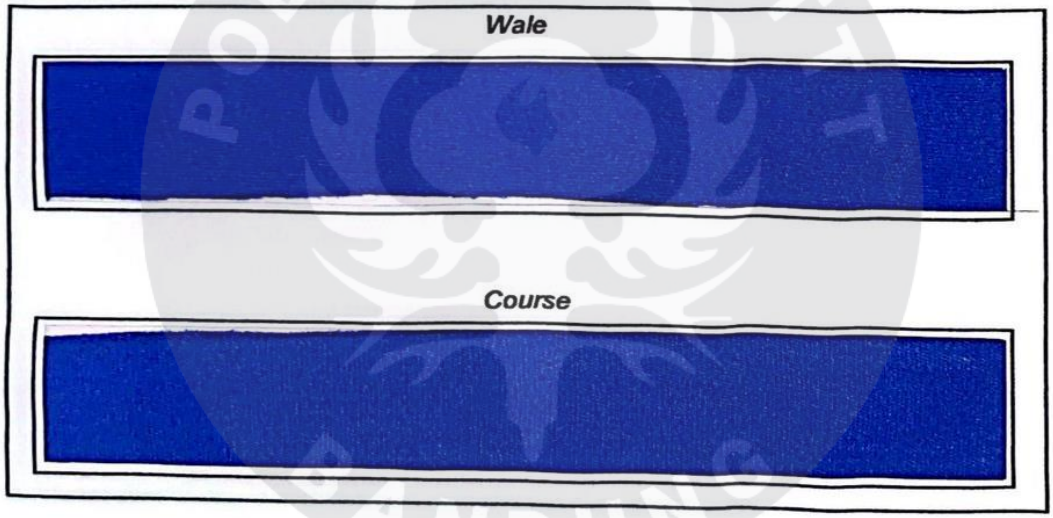


2. Variasi 100 gram dan waktu *curing* 2 menit

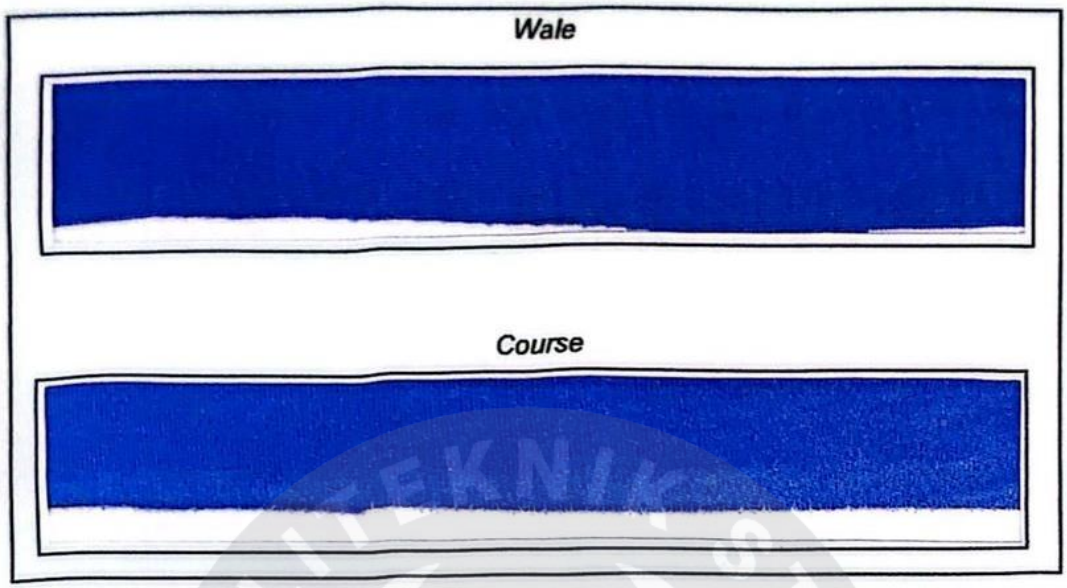
3. Variasi 100 gram dan waktu *curing* 6 menit



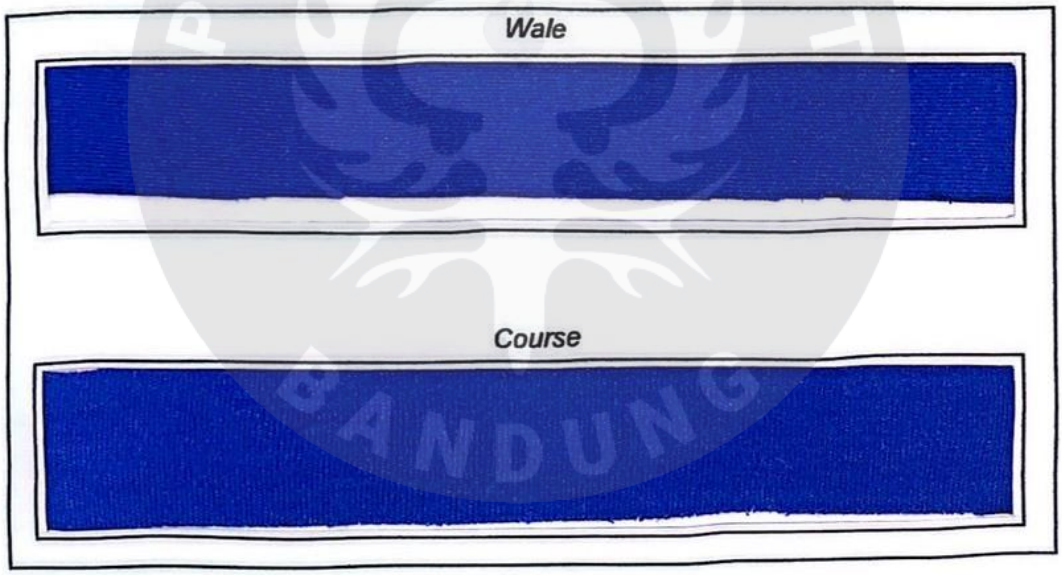
4. Variasi 150 gram dan waktu *curing* 2 menit



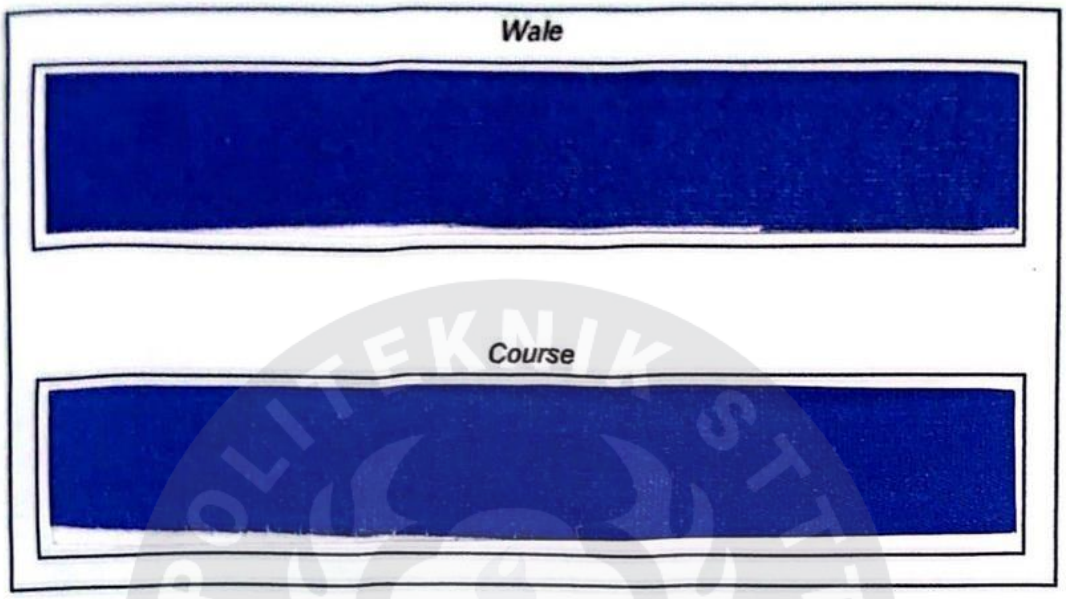
5. Variasi 150 gram dan waktu *curing* 4 menit



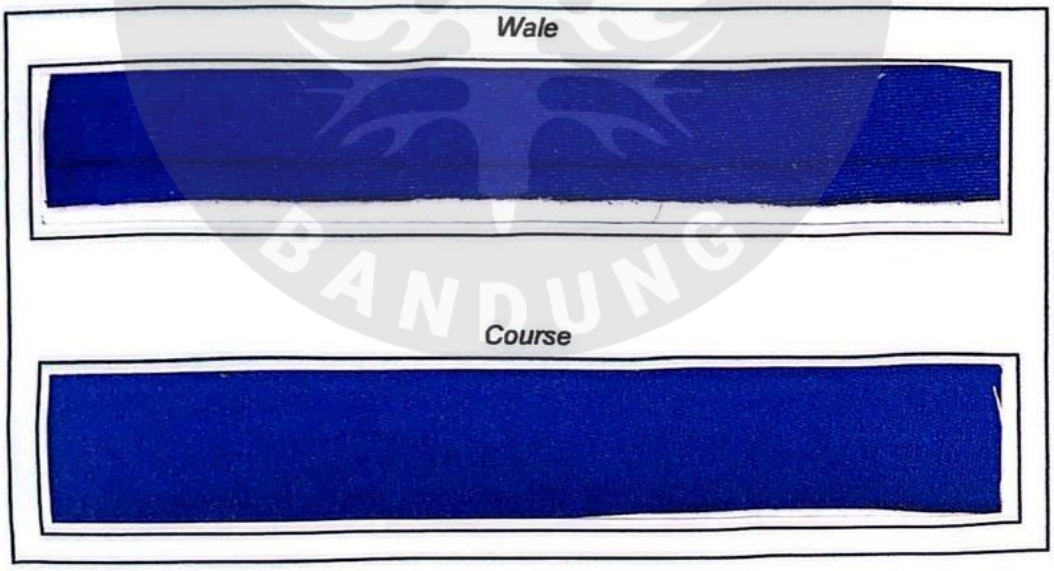
6. Variasi 150 gram dan waktu *curing* 6 menit



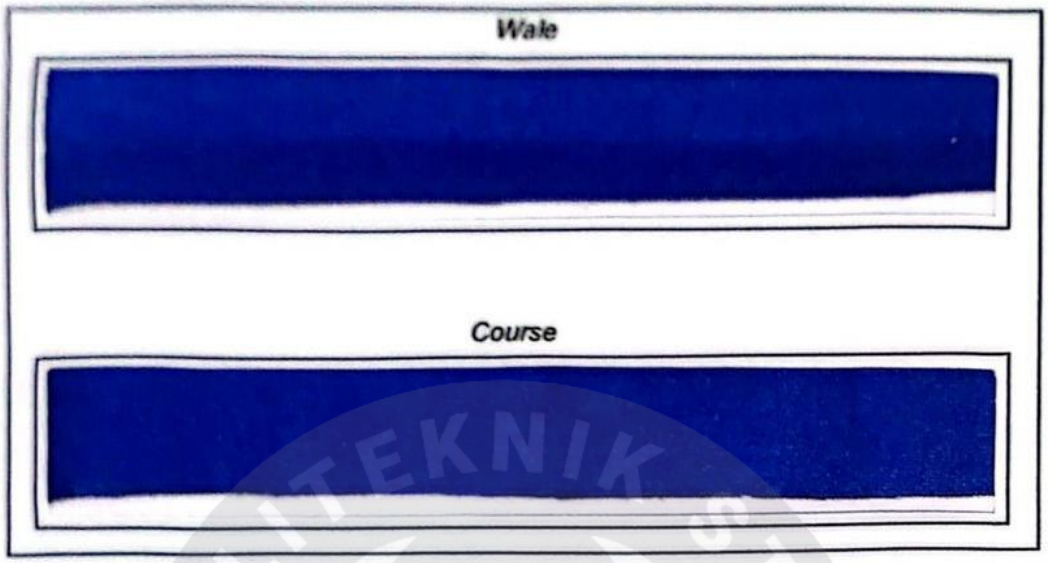
7. Variasi 200 gram dan waktu *curing* 2 menit



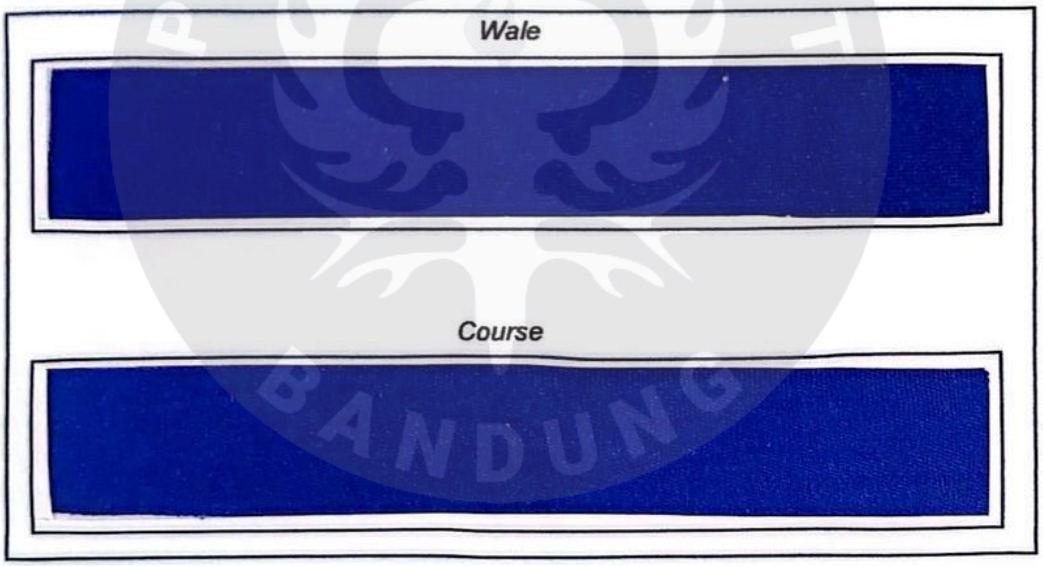
8. Variasi 200 gram dan waktu *curing* 4 menit



9. Variasi 200 gram dan waktu *curing* 6 menit



10. Variasi 250 gram dan waktu *curing* 2 menit



11. **Variasi 250 gram dan waktu *curing* 4 menit**

12. **Variasi 250 gram dan waktu *curing* 6 menit**

Lampiran 1 Perhitungan Kebutuhan Pasta Setiap Konsentrasi

1. Variasi konsentrasi binder 100 gram dan waktu *curing* 2 menit.

Zat warna pigmen : 50 g/kg

Binder : 100 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 2 menit

2. Variasi konsentrasi binder 100 gram dan waktu *curing* 4 menit.

Zat warna pigmen : 50 g/kg

Binder : 100 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 4 menit

3. Variasi konsentrasi binder 100 gram dan waktu *curing* 6 menit.

Zat warna pigmen : 50 g/kg

Binder : 100 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 6 menit

4. Variasi konsentrasi binder 150 gram dan waktu *curing* 2 menit.

Zat warna pigmen : 50 g/kg

Binder : 150 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 2 menit

5. Variasi konsentrasi binder 150 gram dan waktu *curing* 4 menit.

Zat warna pigmen : 50 g/kg

Binder : 150 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 4 menit

6. Variasi konsentrasi binder 150 gram dan waktu *curing* 6 menit.

Zat warna pigmen : 50 g/kg

Binder : 150 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 6 menit

7. Variasi konsentrasi binder 200 gram dan waktu *curing* 2 menit.

Zat warna pigmen : 50 g/kg

Binder : 200 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 2 menit

8. Variasi konsentrasi binder 200 gram dan waktu *curing* 4 menit.

Zat warna pigmen : 50 g/kg

Binder : 200 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 4 menit

9. Variasi konsentrasi binder 200 gram dan waktu *curing* 6 menit.

Zat warna pigmen : 50 g/kg

Binder : 200 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 6 menit

10. Variasi konsentrasi binder 250 gram dan waktu *curing* 2 menit.

Zat warna pigmen : 50 g/kg

Binder : 250 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 2 menit

11. Variasi konsentrasi binder 250 gram dan waktu *curing* 4 menit.

Zat warna pigmen : 50 g/kg

Binder : 250 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 4 menit

12. Variasi konsentrasi binder 250 gram dan waktu *curing* 6 menit.

Zat warna pigmen : 50 g/kg

Binder : 250 g/kg

Pengental : 20 g/kg

Air : X g/kg

1000 gram

Pengeringan : 120°C, 1 menit

Curing : 150°C, 6 menit

Lampiran 2 Perhitungan Pengujian Kekakuan Kain Setiap Variasi

Variasi konsentrasi binder 100 gram dan waktu *curing* 2 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,61 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,725

Rata-rata kekakuan *course* : 1,4

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,725 x 0,5 = 0,8625

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,4 x 0,5 = 0,7

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (0,8625^3) = 0,124$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,7^3) = 0,066$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,124 \times 10^{-6}}{0,61^3} = \mathbf{65,84\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,066 \times 10^{-6}}{0,61^3} = \mathbf{35,04\ kg/cm^2}$$

1. Variasi konsentrasi binder 100 gram dan waktu *curing* 4 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,60 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,825

Rata-rata kekakuan *course* : 1,45

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,825 x 0,5 = 0,9125

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,45 x 0,5 = 0,725

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (0,9125^3) = 0,147$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,725^3) = 0,0739$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,147 \times 10^{-6}}{0,60^3} = \mathbf{81,66\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,0739 \times 10^{-6}}{0,60^3} = \mathbf{41,01\ kg/cm^2}$$

2. Variasi konsentrasi binder 100 gram dan waktu *curing* 6 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,59 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,85

Rata-rata kekakuan *course* : 1,425

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,85 x 0,5 = 0,925

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,425 x 0,5 = 0,7125

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (0,925^3) = 0,153$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,7125^3) = 0,070$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,153 \times 10^{-6}}{0,59^3} = \mathbf{89,56\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}070 \times 10^{-6}}{0{,}59^3} = \mathbf{40{,}97\ kg/cm^2}$$

3. Variasi konsentrasi binder 150 gram dan waktu *curing* 2 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,59 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,675

Rata-rata kekakuan *course* : 1,55

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,675 x 0,5 = 0,8375

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,55 x 0,5 = 0,775

Kekakuan lentur *wale*

$G_L = 0{,}1 \times W (C_L^3) = 0{,}1 \times 1{,}94 \times (0{,}8375^3) = 0{,}113$ mg.cm

Kekakuan lentur *course*

$G_P = 0{,}1 \times W (C_P^3) = 0{,}1 \times 1{,}94 \times (0{,}775^3) = 0{,}090$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}113 \times 10^{-6}}{0{,}59^3} = \mathbf{66{,}14\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}090 \times 10^{-6}}{0{,}59^3} = \mathbf{52{,}68\ kg/cm^2}$$

4. Variasi konsentrasi binder 150 gram dan waktu *curing* 4 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,57 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,825

Rata-rata kekakuan *course* : 1,525

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,825 x 0,5 = 0,9125

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,525 x 0,5 = 0,7625

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (0,9125^3) = 0,147$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,7625^3) = 0,085$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,147 \times 10^{-6}}{0,57^3} = \mathbf{95,35\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,085 \times 10^{-6}}{0,57^3} = \mathbf{55,13\ kg/cm^2}$$

5. Variasi konsentrasi binder 150 gram dan waktu *curing* 6 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,57 g/m^2 (g)

Rata-rata kekakuan *wale* : 1,9

Rata-rata kekakuan *course* : 1,55

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 1,9 x 0,5 = 0,95

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,55 x 0,5 = 0,77

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (0,95^3) = 0,166$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,77^3) = 0,090$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}166 \times 10^{-6}}{0{,}57^3} = \mathbf{107{,}67\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}090 \times 10^{-6}}{0{,}57^3} = \mathbf{58{,}37\ kg/cm^2}$$

6. Variasi konsentrasi binder 200 gram dan waktu *curing* 2 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,63 g/m^2 (g)

Rata-rata kekakuan *wale* : 2

Rata-rata kekakuan *course* : 1,575

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 2 x 0,5 = 1

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,575 x 0,5 = 0,7875

Kekakuan lentur *wale*

$G_L = 0{,}1 \times W (C_L^3) = 0{,}1 \times 1{,}94 \times (1^3) = 0{,}194$ mg.cm

Kekakuan lentur *course*

$G_P = 0{,}1 \times W (C_P^3) = 0{,}1 \times 1{,}94 \times (0{,}7875^3) = 0{,}094$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}194 \times 10^{-6}}{0{,}63^3} = \mathbf{93{,}12\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}094 \times 10^{-6}}{0{,}63^3} = \mathbf{45{,}12\ kg/cm^2}$$

7. Variasi konsentrasi binder 200 gram dan waktu *curing* 4 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,65 g/m^2 (g)

Rata-rata kekakuan *wale* : 2,075

Rata-rata kekakuan *course* : 1,725

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 2,075 x 0,5 = 1,0375

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,725 x 0,5 = 0,8625

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (1,0375^3) = 0,216$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,8625^3) = 0,124$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,216 \times 10^{-6}}{0,65^3} = \mathbf{94,59\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,124 \times 10^{-6}}{0,65^3} = \mathbf{54,30\ kg/cm^2}$$

8. Variasi konsentrasi binder 200 gram dan waktu *curing* 6 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,60 g/m^2 (g)

Rata-rata kekakuan *wale* : 2,1

Rata-rata kekakuan *course* : 1,625

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 2,1 x 0,5 = 1,05

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,625 x 0,5 = 0,8125

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (1,05^3) = 0,224$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,8125^3) = 0,103$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,224 \times 10^{-6}}{0,60^3} = \mathbf{124,44\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,103 \times 10^{-6}}{0,60^3} = \mathbf{57,22\ kg/cm^2}$$

9. Variasi konsentrasi binder 200 gram dan waktu *curing* 2 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,63 g/m^2 (g)

Rata-rata kekakuan *wale* : 2,125

Rata-rata kekakuan *course* : 1,7

Perhitungan :

Panjang lengkung rata-rata *wale* ($C_L \times 0,5$) = 2,125 x 0,5 = 1,0625

Panjang lengkung rata-rata *course* ($C_P \times 0,5$) = 1,7 x 0,5 = 0,85

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (1,0625^3) = 0,232$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,85^3) = 0,119$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,232 \times 10^{-6}}{0,63^3} = \mathbf{111,36\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,119 \times 10^{-6}}{0,63^3} = \mathbf{57,12\ kg/cm^2}$$

10. Variasi konsentrasi binder 200 gram dan waktu *curing* 4 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,63 g/m^2 (g)

Rata-rata kekakuan *wale* : 2,275

Rata-rata kekakuan *course* : 1,75

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 2,275 x 0,5 = 1,1375

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,75 x 0,5 = 0,875

Kekakuan lentur *wale*

$G_L = 0,1 \times W (C_L^3) = 0,1 \times 1,94 \times (1,1375^3) = 0,285$ mg.cm

Kekakuan lentur *course*

$G_P = 0,1 \times W (C_P^3) = 0,1 \times 1,94 \times (0,875^3) = 0,129$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,285 \times 10^{-6}}{0,63^3} = \mathbf{136,8\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0,129 \times 10^{-6}}{0,63^3} = \mathbf{68,49\ kg/cm^2}$$

11. Variasi konsentrasi binder 200 gram dan waktu *curing* 6 menit.

Berat kain : 1,94 gram (W)

Ketebalan kain : 0,63 g/m^2 (g)

Rata-rata kekakuan *wale* : 2,325

Rata-rata kekakuan *course* : 1,875

Perhitungan :

Panjang lengkung rata-rata *wale* (C_L x 0,5) = 2,325 x 0,5 = 1,1625

Panjang lengkung rata-rata *course* (C_P x 0,5) = 1,875 x 0,5 = 0,9375

Kekakuan lentur *wale*

$G_L = 0{,}1 \times W (C_L^3) = 0{,}1 \times 1{,}94 \times (1{,}1625^3) = 0{,}304$ mg.cm

Kekakuan lentur *course*

$G_P = 0{,}1 \times W (C_P^3) = 0{,}1 \times 1{,}94 \times (0{,}9375^3) = 0{,}159$ mg.cm

Bending modulus *wale*

$$Q_L = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}304 \times 10^{-6}}{0{,}63^3} = \mathbf{145{,}92\ kg/cm^2}$$

Bending modulus *course*

$$Q_P = \frac{12 \times G_T \times 10^{-6}}{g^3} = \frac{12 \times 0{,}159 \times 10^{-6}}{0{,}63^3} = \mathbf{76{,}32\ kg/cm^2}$$