

LAMPIRAN A GAMBAR

1. Pembuatan biodiesel

Proses degumming



Penambahan asam phospat



Pemisahan degumming

Proses esterifikasi



Penambahan metanol



Penambahan asam sulfat



Pemisahan esterifikasi

Proses transesterifikasi



Penimbangan KOH



Pembuatan larutan metoksida



Penambahan larutan metoksida ke hasil esterifikasi



Pemisahan transesterifikasi

Pencucian biodiesel



Aquades hangat



Pencucian biodiesel dengan aquades



Pemanasan biodiesel

2. Analisis densitas



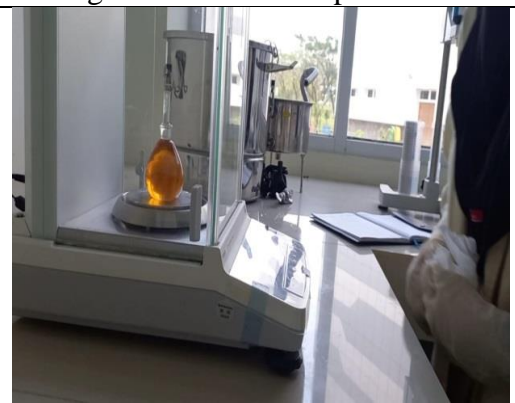
Penimbangan piknometer kosong



Pengisian biodiesel ke piknometer



Piknometer yang sudah berisi biodiesel



Penimbangan piknometer berisi biodiesel

3. Analisis viskositas



Masukkan biodiesel ke dalam tube



Ukur viskositas

4. Analisis kadar air



Suhu oven 130°C



Penimbangan kurs kosong



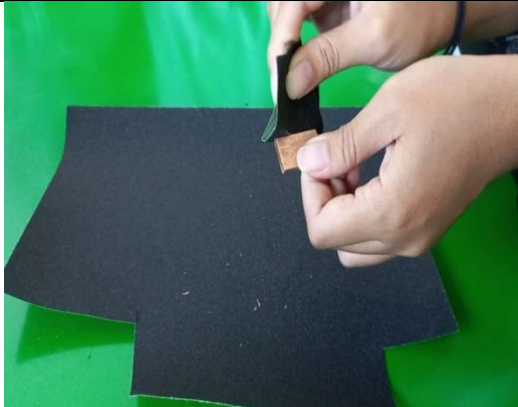
Buka kurs ketika dioven



Tutup kurs setelah oven selesai

5. Analisis laju korosi

Persiapan Lempeng Tembaga



Proses pengamplasan tembaga



Tembaga yang sudah diampelas

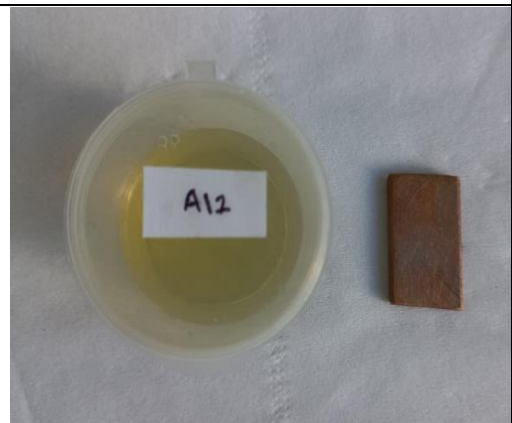
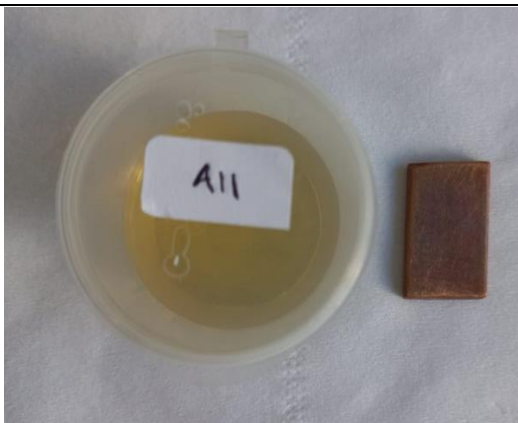


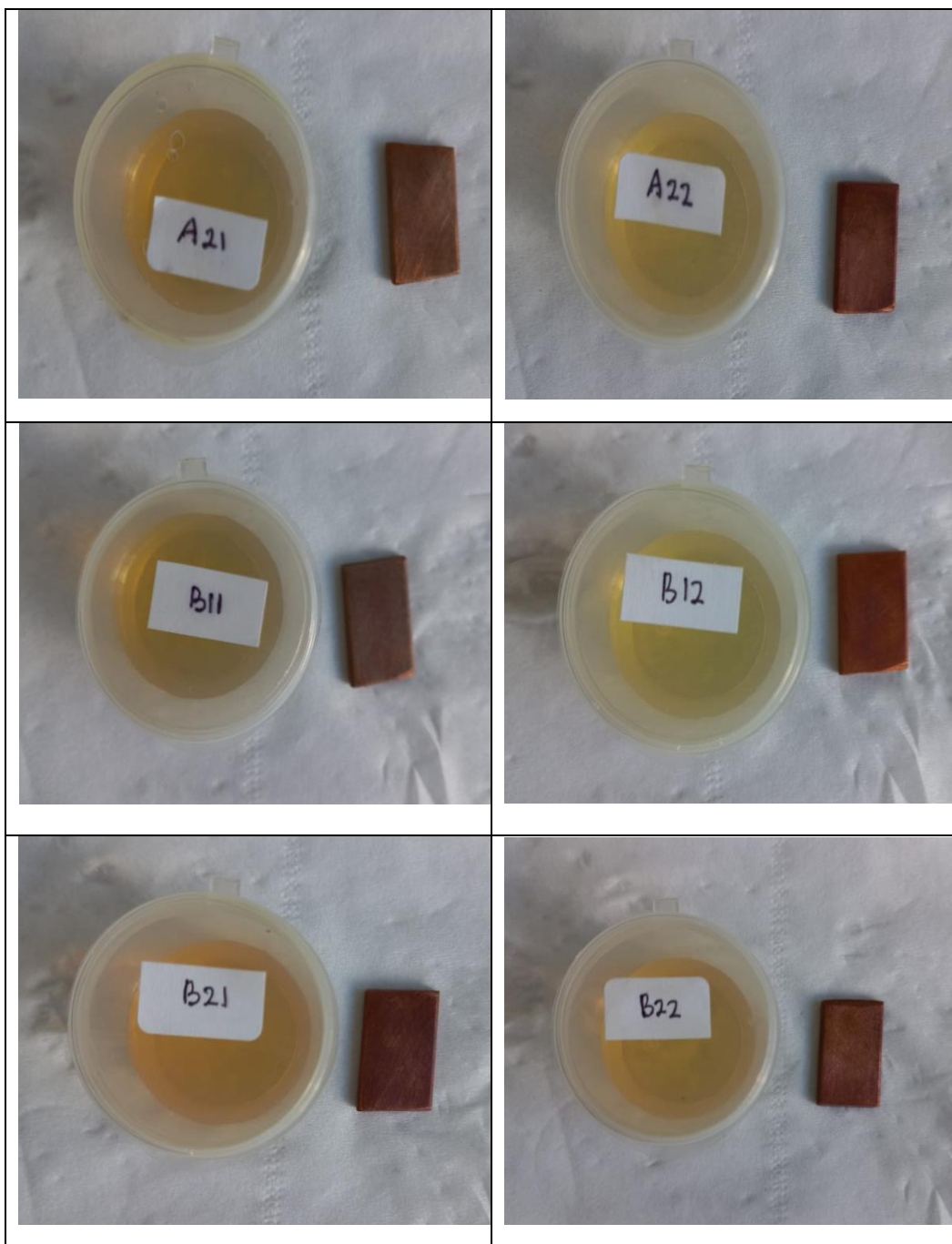
Pencucian menggunakan alkohol

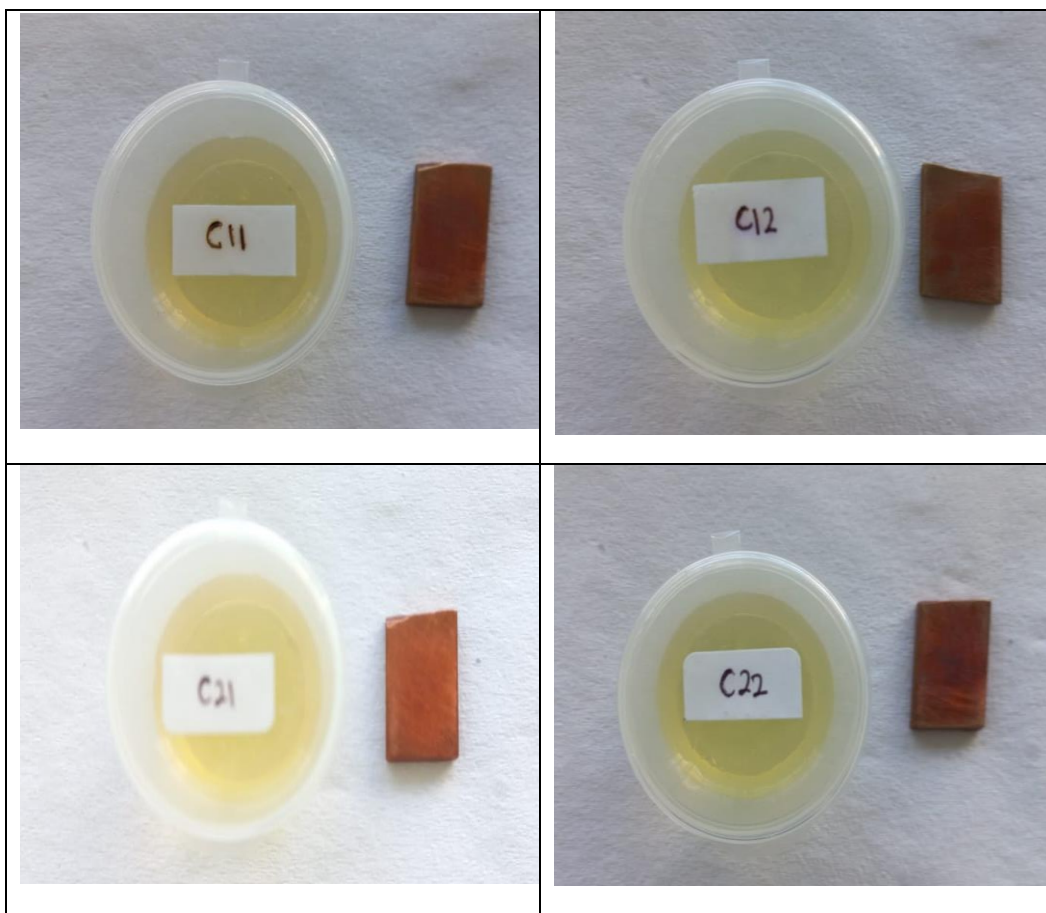


Pencucian menggunakan aquades

Tembaga hari ke-7

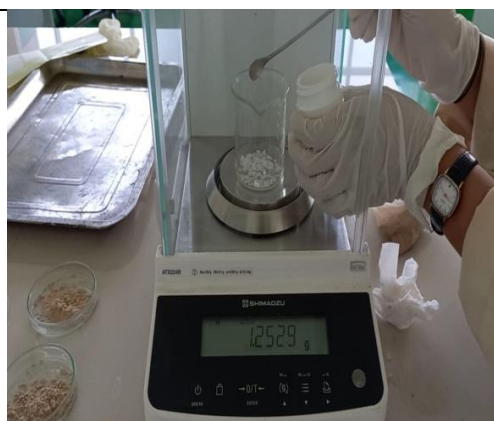






6. Analisis angka asam

Pembuatan Larutan Alkali



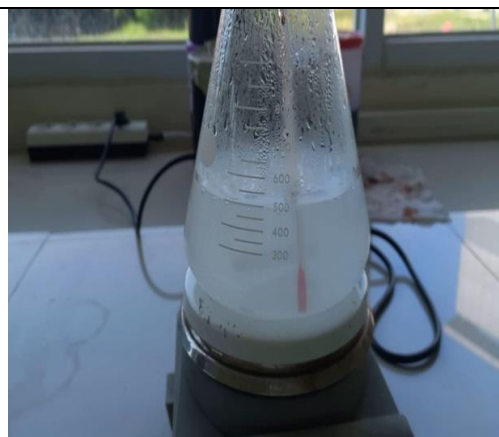
Penimbangan KOH Pa



Melarutkan KOH Pa dengan aquades



Penimbangan Barium Hidroksida



Melarutkan Barium Hidroksida
kedalam aquades + KOH Pa

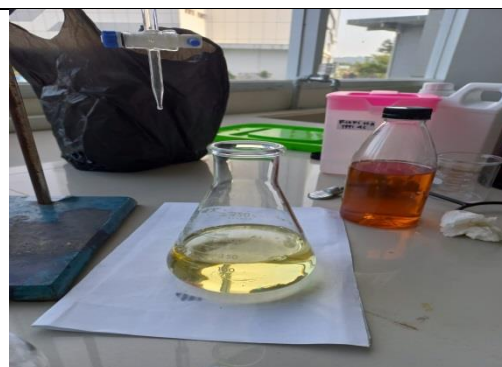
Titration



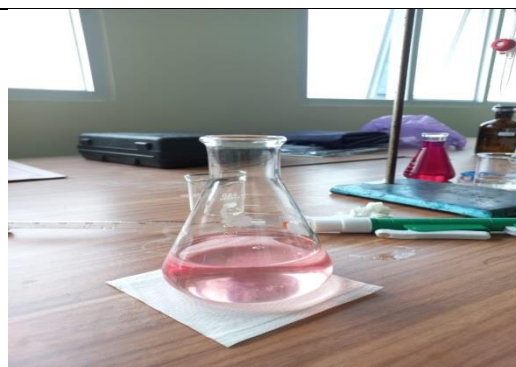
Titration blanko dengan larutan alkali



Hasil titration blanko dengan alkali



Titration biodiesel dengan larutan alkali



Hasil titration biodiesel dengan alkali

LAMPIRAN B DATA PERHITUNGAN

1. Perhitungan konsentrasi H₃PO₄, H₂SO₄ dan KOH

➤ A11

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0,5 \%} = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ ml}$$

$$\text{Konsentrasi KOH 0,5 \%} = \frac{0,5}{100} \times 295 \text{ ml} = 1,475 \text{ gram}$$

$$\text{Konsentrasi metanol : volume minyak} = 1 : 2,5$$

$$\text{Konsentrasi metanol} = \frac{295 \text{ ml}}{2,5} = 118 \text{ ml}$$

➤ A12

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0,5 \%} = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ ml}$$

$$\text{Konsentrasi KOH 1 \%} = \frac{1}{100} \times 295 \text{ ml} = 2,95 \text{ gram}$$

$$\text{Konsentrasi metanol : volume minyak} = 1 : 2,5$$

$$\text{Konsentrasi metanol} = \frac{295 \text{ ml}}{2,5} = 118 \text{ ml}$$

➤ A21

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi KOH 0,5 \%} = \frac{0,5}{100} \times 298 \text{ ml} = 1,49 \text{ gram}$$

$$\text{Konsentrasi metanol : volume minyak} = 1 : 2,5$$

$$\text{Konsentrasi metanol} = \frac{298 \text{ ml}}{2,5} = 119 \text{ ml}$$

➤ A22

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi KOH 1 \%} = \frac{1}{100} \times 298 \text{ ml} = 2,98 \text{ gram}$$

$$\text{Konsentrasi metanol : volume minyak} = 1 : 2,5$$

$$\text{Konsentrasi metanol} = \frac{298 \text{ ml}}{2,5} = 119 \text{ ml}$$

➤ B11

$$\text{Konsentrasi H}_3\text{PO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0,5 \%} = \frac{0,5}{100} \times 290 \text{ ml} = 1,45 \text{ ml}$$

$$\text{Konsentrasi KOH 0,5 \%} = \frac{0,5}{100} \times 290 \text{ ml} = 1,45 \text{ gram}$$

$$\text{Konsentrasi metanol : volume minyak} = 1 : 2,5$$

$$\text{Konsentrasi metanol} = \frac{290 \text{ ml}}{2,5} = 116 \text{ ml}$$

➤ B12

$$\text{Konsentrasi H}_3\text{PO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0,5 \%} = \frac{0,5}{100} \times 290 \text{ ml} = 1,45 \text{ ml}$$

$$\text{Konsentrasi KOH 1 \%} = \frac{1}{100} \times 290 \text{ ml} = 2,9 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{290 \text{ ml}}{2,5} = 116 \text{ ml}$$

➤ B21

$$\text{Konsentrasi H}_3\text{PO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 1 \%} = \frac{1}{100} \times 290 \text{ ml} = 2,9 \text{ ml}$$

$$\text{Konsentrasi KOH 0.5 \%} = \frac{0,5}{100} \times 290 \text{ ml} = 1,45 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{290 \text{ ml}}{2,5} = 116 \text{ ml}$$

➤ B22

$$\text{Konsentrasi H}_3\text{PO}_4 \text{ 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 1 \%} = \frac{1}{100} \times 290 \text{ ml} = 2,9 \text{ ml}$$

$$\text{Konsentrasi KOH 1 \%} = \frac{1}{100} \times 290 \text{ ml} = 2,9 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{290 \text{ ml}}{2,5} = 116 \text{ ml}$$

➤ C11

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0.5 \%} = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ ml}$$

$$\text{Konsentrasi KOH 0.5 \%} = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{300 \text{ ml}}{2,5} = 120 \text{ ml}$$

➤ C12

$$\text{Konsentrasi H}_2\text{SO}_4 \text{ 0.5 \%} = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ ml}$$

$$\text{Konsentrasi KOH 1 \%} = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{300 \text{ ml}}{2,5} = 120 \text{ ml}$$

➤ C21

$$\text{Konsentrasi H}_2\text{SO}_4 1 \% = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi KOH } 0.5 \% = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{300 \text{ ml}}{2,5} = 120 \text{ ml}$$

➤ C22

$$\text{Konsentrasi H}_2\text{SO}_4 1 \% = \frac{1}{100} \times 300 \text{ ml} = 3 \text{ ml}$$

$$\text{Konsentrasi KOH } 1 \% = \frac{0,5}{100} \times 300 \text{ ml} = 1,5 \text{ gram}$$

Konsentrasi metanol : volume minyak = 1 : 2,5

$$\text{Konsentrasi metanol} = \frac{300 \text{ ml}}{2,5} = 120 \text{ ml}$$

2. Perhitungan rendemen biodiesel

$$\% \text{ rendemen biodiesel} = \frac{\text{volume produk}}{\text{volume bahan baku}} \times 100 \%$$

➤ A11

Volume produk = 257 ml

Volume bahan baku = 300 ml

$$\begin{aligned} \% \text{ rendemen biodiesel} &= \frac{257 \text{ ml}}{300 \text{ ml}} \times 100 \% \\ &= 85,67 \% \end{aligned}$$

➤ A12

Volume produk = 243 ml

Volume bahan baku = 300 ml

$$\begin{aligned} \% \text{ rendemen biodiesel} &= \frac{243 \text{ ml}}{300 \text{ ml}} \times 100 \% \\ &= 81 \% \end{aligned}$$

➤ A21

Volume produk = 264 ml

Volume bahan baku = 300 ml

$$\begin{aligned} \% \text{ rendemen biodiesel} &= \frac{264 \text{ ml}}{300 \text{ ml}} \times 100 \% \\ &= 88\% \end{aligned}$$

➤ A22

Volume produk = 252 ml

Volume bahan baku = 300 ml

$$\begin{aligned} \% \text{ rendemen biodiesel} &= \frac{252 \text{ ml}}{300 \text{ ml}} \times 100 \% \\ &= 84 \% \end{aligned}$$

- B11
 Volume produk = 265 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{265 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 88 \%$$
- B12
 Volume produk = 246 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{246 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 82 \%$$
- B21
 Volume produk = 268 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{268 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 89 \%$$
- B22
 Volume produk = 264 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{264 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 88 \%$$
- C11
 Volume produk = 267 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{267 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 89 \%$$
- C12
 Volume produk = 260 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{260 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 87 \%$$
- C21
 Volume produk = 272 ml
 Volume bahan baku = 300 ml

$$\% \text{ rendemen biodiesel} = \frac{272 \text{ ml}}{300 \text{ ml}} \times 100 \%$$

$$= 91 \%$$
- C22

Volume produk = 257 ml

Volume bahan baku = 300 ml

$$\begin{aligned}\% \text{ rendemen biodiesel} &= \frac{257 \text{ ml}}{300 \text{ ml}} \times 100 \% \\ &= 86 \%\end{aligned}$$

3. Perhitungan densitas biodiesel (SNI berkisar antara 850 – 890 kg/m³)

$$\rho = \frac{\text{berat piknometer isi} - \text{berat piknometer kosong}}{\text{volume piknometer}}$$

➤ A11

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,3614 gram

Volume piknometer = 50 ml

$$\begin{aligned}\rho &= \frac{75,3614 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}} \\ &= 0,8827 \text{ gr/ml}\end{aligned}$$

➤ A12

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,4051 gram

Volume piknometer = 50 ml

$$\begin{aligned}\rho &= \frac{75,4051 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}} \\ &= 0,8836 \text{ gr/ml}\end{aligned}$$

➤ A21

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,4179 gram

Volume piknometer = 50 ml

$$\begin{aligned}\rho &= \frac{75,4179 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}} \\ &= 0,8838 \text{ gr/ml}\end{aligned}$$

➤ A22

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,3398 gram

Volume piknometer = 50 ml

$$\begin{aligned}\rho &= \frac{75,3398 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}} \\ &= 0,8823 \text{ gr/ml}\end{aligned}$$

➤ B11

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,3916 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,3916 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8833 \text{ gr/ml}$$

➤ B12

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,3348 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,3348 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8822 \text{ gr/ml}$$

➤ B21

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,6089 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,6089 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8876 \text{ gr/ml}$$

➤ B22

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,2931 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,2931 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8813 \text{ gr/ml}$$

➤ C11

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,4759 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,4759 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8850 \text{ gr/ml}$$

➤ C12

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,4676 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,4676 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8848 \text{ gr/ml}$$

➤ C21

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,5450 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,5450 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8864 \text{ gr/ml}$$

➤ C22

Berat piknometer kosong = 31,2272 gram

Berat piknometer isi = 75,4806 gram

Volume piknometer = 50 ml

$$\rho = \frac{75,4806 \text{ gr} - 31,2272 \text{ gr}}{50 \text{ ml}}$$
$$= 0,8851 \text{ gr/ml}$$

4. Perhitungan viskositas biodiesel (SNI berkisar antara 2,3 – 6,0 mm²/s)

5. Perhitungan kadar air biodiesel (SNI maksimal 0.05%)

$$\% \text{ kadar air dan zat menguap} = \frac{W_1 - W_2}{W_0} \times 100\%$$

6. Perhitungan penurunan lempeng tembaga selama tujuh hari

$$\% = \frac{\text{berat awal} - \text{berat akhir}}{\text{berat awal}} \times 100 \%$$

➤ A11

$$\% = \frac{9,0549 - 9,0540}{9,0549} \times 100 \%$$
$$= 0,010\%$$

➤ A12

$$\% = \frac{9,6255 - 9,6234}{9,6255} \times 100 \%$$

$$= 0,017\%$$

➤ A21

$$\% = \frac{9,3990 - 9,3984}{9,3990} \times 100 \%$$

$$= 0,006\%$$

➤ A22

$$\% = \frac{9,3465 - 9,3458}{9,3465} \times 100 \%$$

$$= 0,007\%$$

➤ B11

$$\% = \frac{9,5187 - 9,5173}{9,5187} \times 100 \%$$

$$= 0,015\%$$

➤ B12

$$\% = \frac{9,1518 - 9,1511}{9,1518} \times 100 \%$$

$$= 0,008\%$$

➤ B21

$$\% = \frac{9,2939 - 9,2939}{9,2939} \times 100 \%$$

$$= 0$$

➤ B22

$$\% = \frac{9,2207 - 9,2203}{9,2207} \times 100 \%$$

$$= 0,004\%$$

➤ C11

$$\% = \frac{9,4401 - 9,4392}{9,4401} \times 100 \%$$

$$= 0,010\%$$

➤ C12

$$\% = \frac{8,5987 - 8,5978}{8,5987} \times 100 \%$$

$$= 0,010\%$$

➤ C21

$$\begin{aligned}\% &= \frac{8,7699 - 8,7694}{8,7699} \times 100 \% \\ &= 0,006\%\end{aligned}$$

➤ C22

$$\begin{aligned}\% &= \frac{8,8448 - 8,8439}{8,8448} \times 100 \% \\ &= 0,010\%\end{aligned}$$

7. Perhitungan laju korosi lempeng tembaga

$$\text{Luas permukaan tembaga} = 2 (pl + pt + lt)$$

$$\text{Laju korosi} = \frac{W_o - W_f}{A \times t}$$

➤ A11

Panjang tembaga = 23,5 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,0549 gram

Berat akhir tembaga (W_f) = 9,0540 gram

Luas permukaan tembaga (A) = $930,7 \text{ mm}^2 = 93,07 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,0549 - 9,0540}{93,07 \times 7} = 0,0000014 \text{ gr/cm}^2 \cdot \text{hari}$$

➤ A12

Panjang tembaga = 24,6 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,6255 gram

Berat akhir tembaga (W_f) = 9,6234 gram

Luas permukaan tembaga (A) = $970 \text{ mm}^2 = 97 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,6255 - 9,6234}{97 \times 7} = 0,0000024 \text{ gr/cm}^2 \cdot \text{hari}$$

➤ A21

Panjang tembaga = 24,2 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,3990 gram

Berat akhir tembaga (W_f) = 9,3984 gram

Luas permukaan tembaga (A) = $955,76 \text{ mm}^2 = 95,576 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,3990 - 9,3984}{95,576 \times 7} = 0,0000009 \text{ gr/cm}^2.\text{hari}$$

➤ A22

Panjang tembaga = 24,1 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,3465 gram

Berat akhir tembaga (W_f) = 9,3458 gram

Luas permukaan tembaga (A) = $952,18 \text{ mm}^2 = 95,218 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,3465 - 9,3458}{95,218 \times 7} = 0,0000011 \text{ gr/cm}^2.\text{hari}$$

➤ B11

Panjang tembaga = 24,5 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,5187 gram

Berat akhir tembaga (W_f) = 9,5173 gram

Luas permukaan tembaga (A) = $966,5 \text{ mm}^2 = 96,65 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,5187 - 9,5173}{96,65 \times 7} = 0,0000021 \text{ gr/cm}^2.\text{hari}$$

➤ B12

Panjang tembaga = 23,7 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,1518 gram

Berat akhir tembaga (W_f) = 9,1511 gram

Luas permukaan tembaga (A) = $937,86 \text{ mm}^2 = 93,786 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,1518 - 9,1511}{93,786 \times 7} = 0,0000011 \text{ gr/cm}^2 \cdot \text{hari}$$

➤ B21

Panjang tembaga = 24 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,2939 gram

Berat akhir tembaga (W_f) = 9,2939 gram

Luas permukaan tembaga (A) = $948,86 \text{ mm}^2 = 94,86 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,2939 - 9,2939}{94,86 \times 7} = 0$$

➤ B22

Panjang tembaga = 23,7 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,2207 gram

Berat akhir tembaga (W_f) = 9,2203 gram

Luas permukaan tembaga (A) = $937,86 \text{ mm}^2 = 93,786 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,2207 - 9,2203}{93,786 \times 7} = 0,0000006 \text{ gr/cm}^2 \cdot \text{hari}$$

➤ C11

Panjang tembaga = 24,5 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (W_o) = 9,4401 gram

Berat akhir tembaga (W_f) = 9,4392 gram

Luas permukaan tembaga (A) = $966,5 \text{ mm}^2 = 96,65 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{9,4401 - 9,4392}{96,65 \times 7} = 0,0000013 \text{ gr/cm}^2.\text{hari}$$

➤ C12

Panjang tembaga = 22 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (Wo) = 8,5987 gram

Berat akhir tembaga (Wf) = 8,5978 gram

Luas permukaan tembaga (A) = $877 \text{ mm}^2 = 87,7 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{8,5987 - 8,5978}{87,7 \times 7} = 0,0000015 \text{ gr/cm}^2.\text{hari}$$

➤ C21

Panjang tembaga = 22,7 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (Wo) = 8,7699 gram

Berat akhir tembaga (Wf) = 8,7694 gram

Luas permukaan tembaga (A) = $902,06 \text{ mm}^2 = 90,206 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{8,7699 - 8,7694}{90,206 \times 7} = 0,0000008 \text{ gr/cm}^2.\text{hari}$$

➤ B22

Panjang tembaga = 22,5 mm

Lebar tembaga = 14,9 mm

Tinggi tembaga = 3 mm

Berat awal tembaga (Wo) = 8,8448 gram

Berat akhir tembaga (Wf) = 8,8439 gram

Luas permukaan tembaga (A) = $894,9 \text{ mm}^2 = 89,49 \text{ cm}^2$

Waktu perendaman (t) = 7 hari

$$\text{Laju korosi} = \frac{8,8448 - 8,8439}{89,49 \times 7} = 0,0000014 \text{ gr/cm}^2.\text{hari}$$

8. Perhitungan angka asam biodiesel (SNI maks 0,5 mgKOH/g)

$$\text{Angka asam} = \frac{(A-B) \times N \times 56,1}{W}$$

➤ A11

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ A12

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ A21

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ A22

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ B11

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ B12

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ B21

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ B22

$$A = 0,7 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,7 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,113$$

➤ C11

$$A = 0,5 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,5 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0$$

➤ C12

$$A = 0,6 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

➤ C21

$$A = 0,5 \text{ ml}$$

$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,5 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0$$

➤ C22

$$A = 0,6 \text{ ml}$$

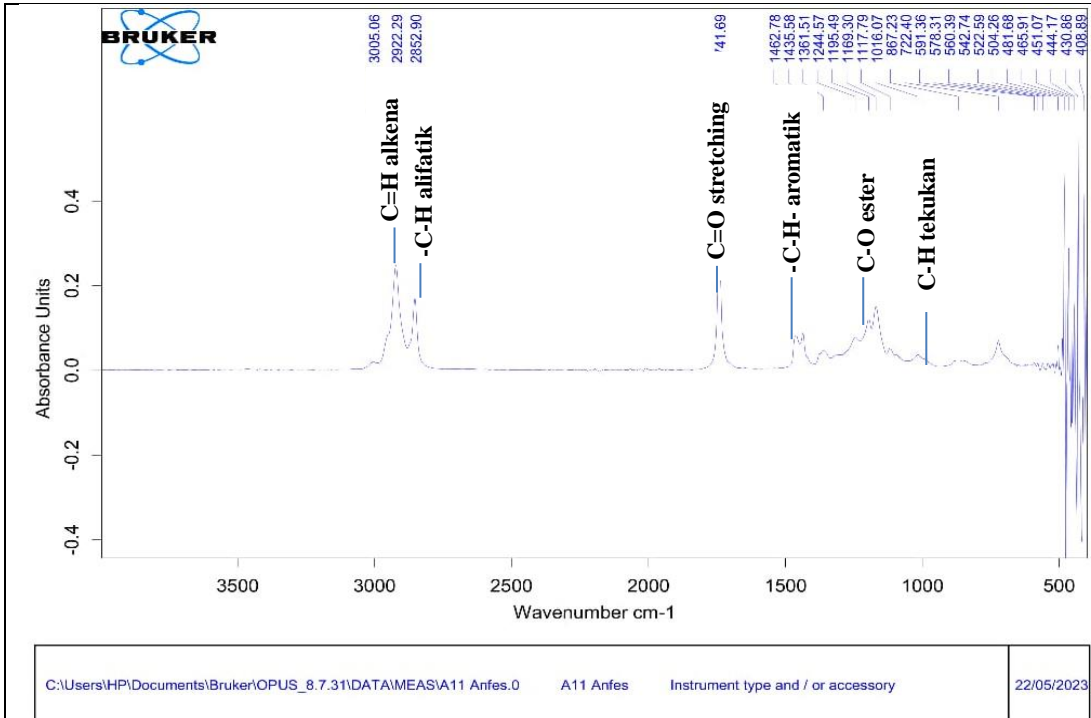
$$B = 0,5 \text{ ml}$$

$$N = 0,1$$

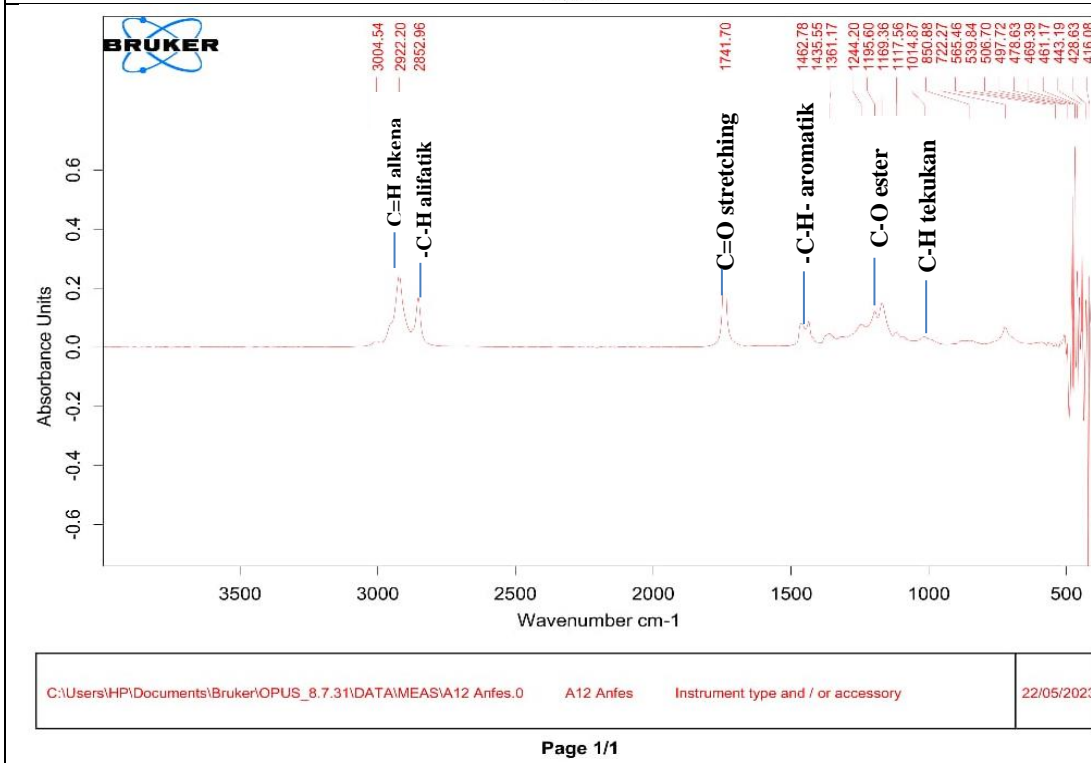
$$W = 10 \text{ gram}$$

$$\text{Angka asam} = \frac{(0,6 \text{ ml} - 0,5 \text{ ml}) \times 0,1 \times 56,1}{10 \text{ gram}} = 0,05$$

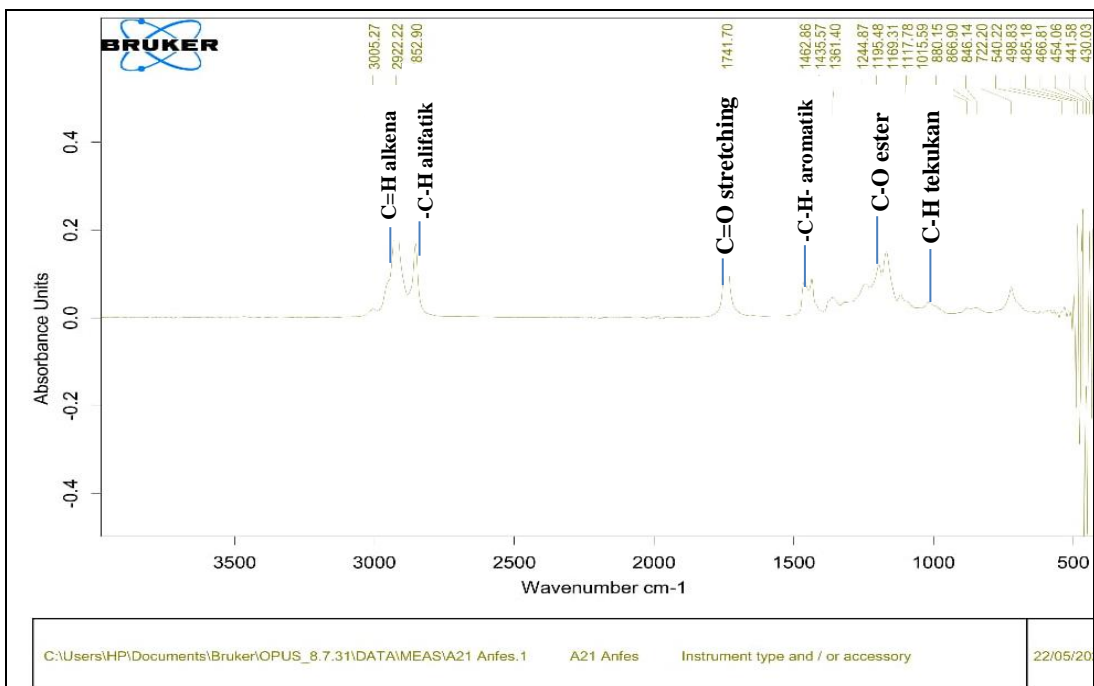
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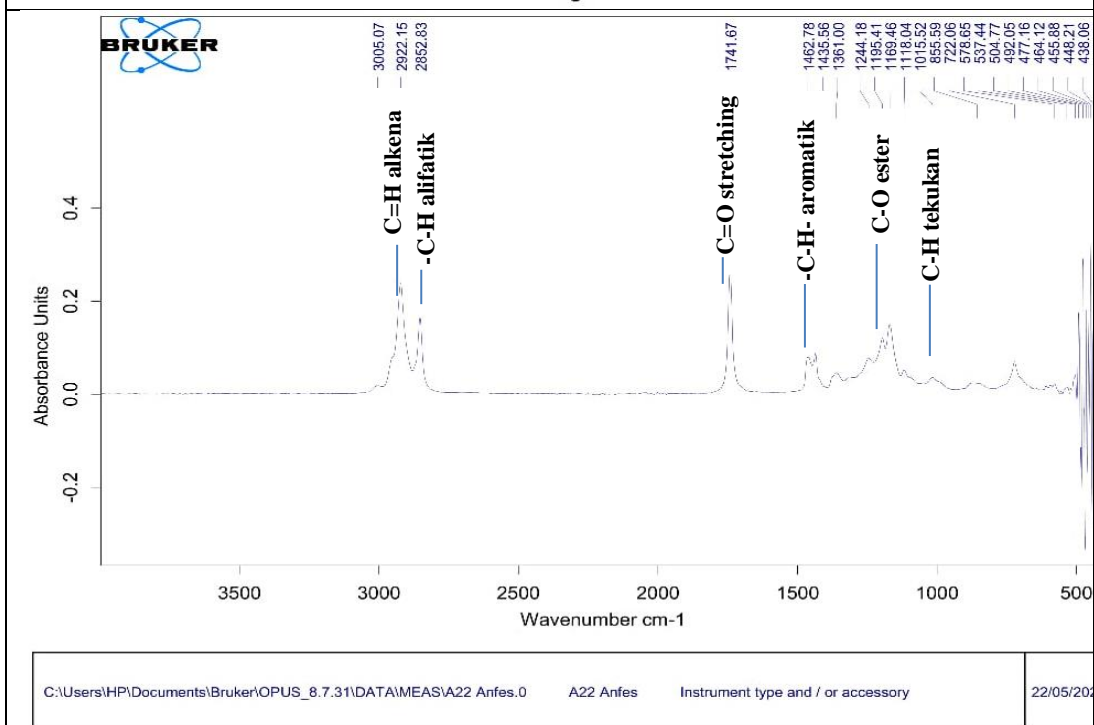
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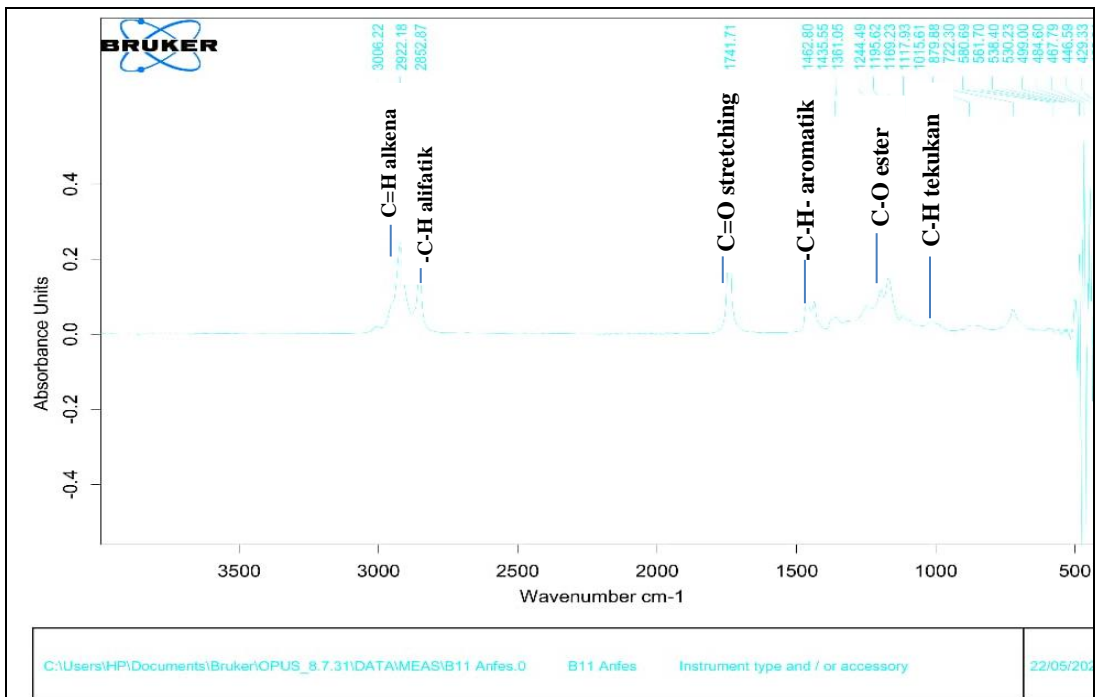
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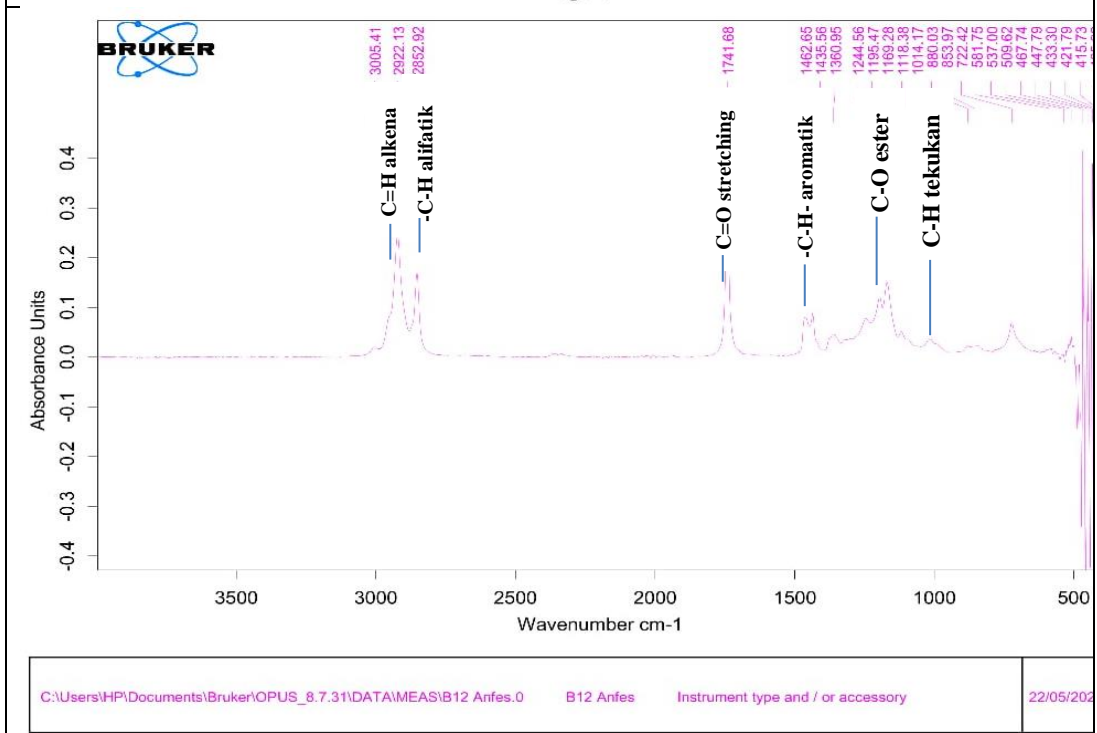
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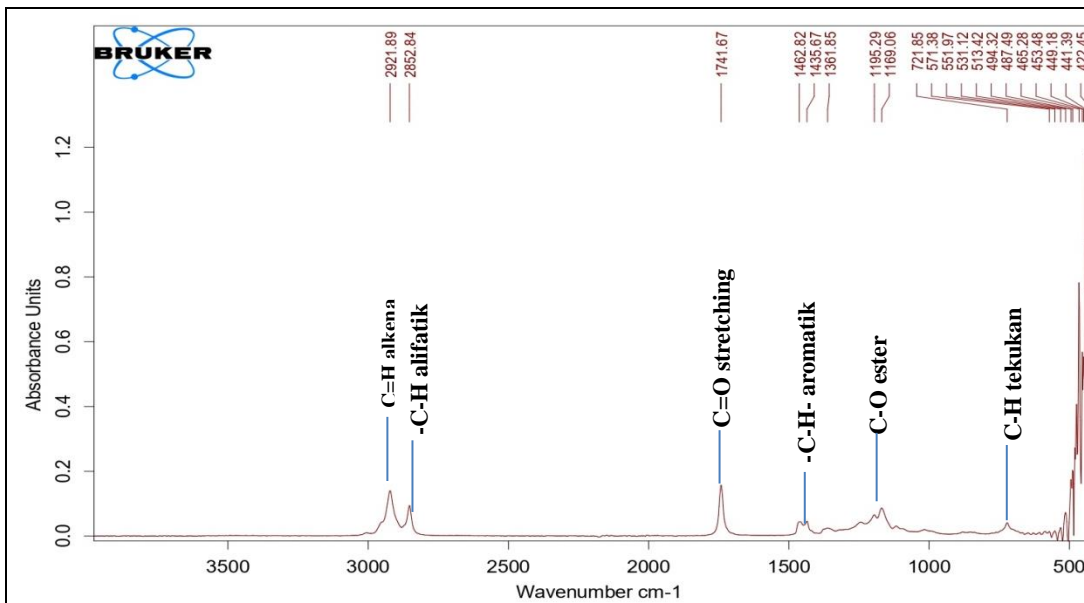
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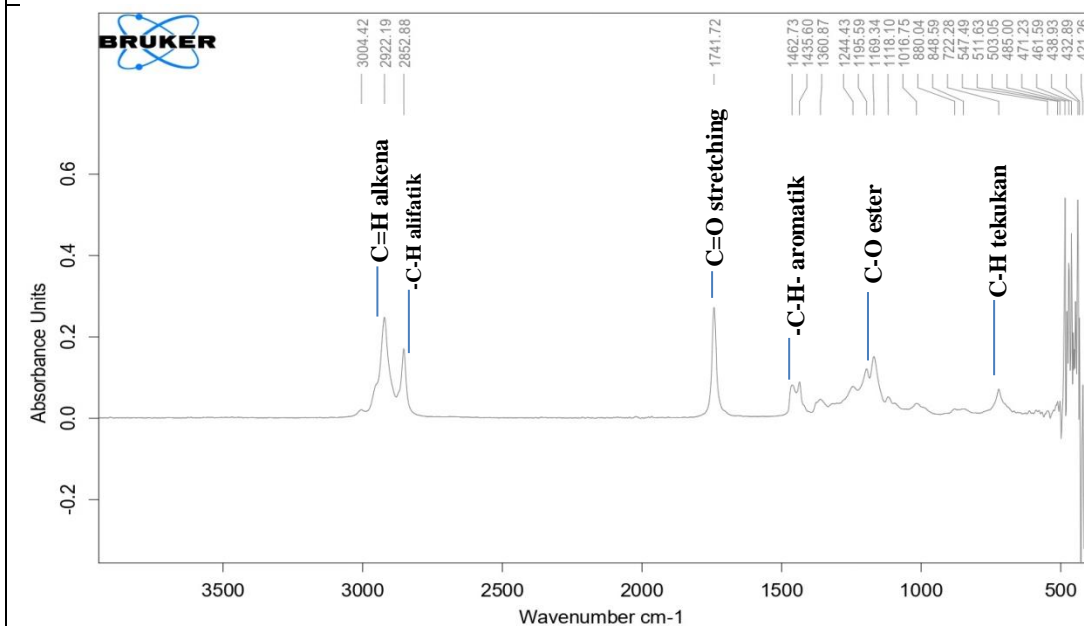
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B21 Anfes

Instrument type and / or accessory

22/05/202

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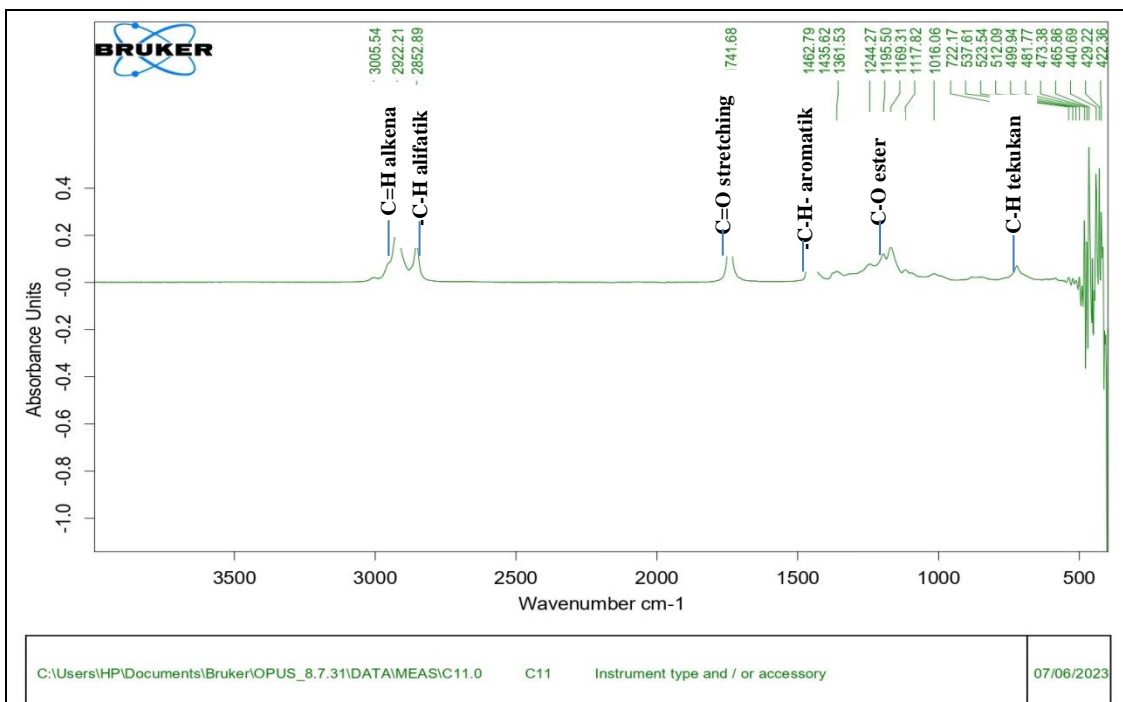
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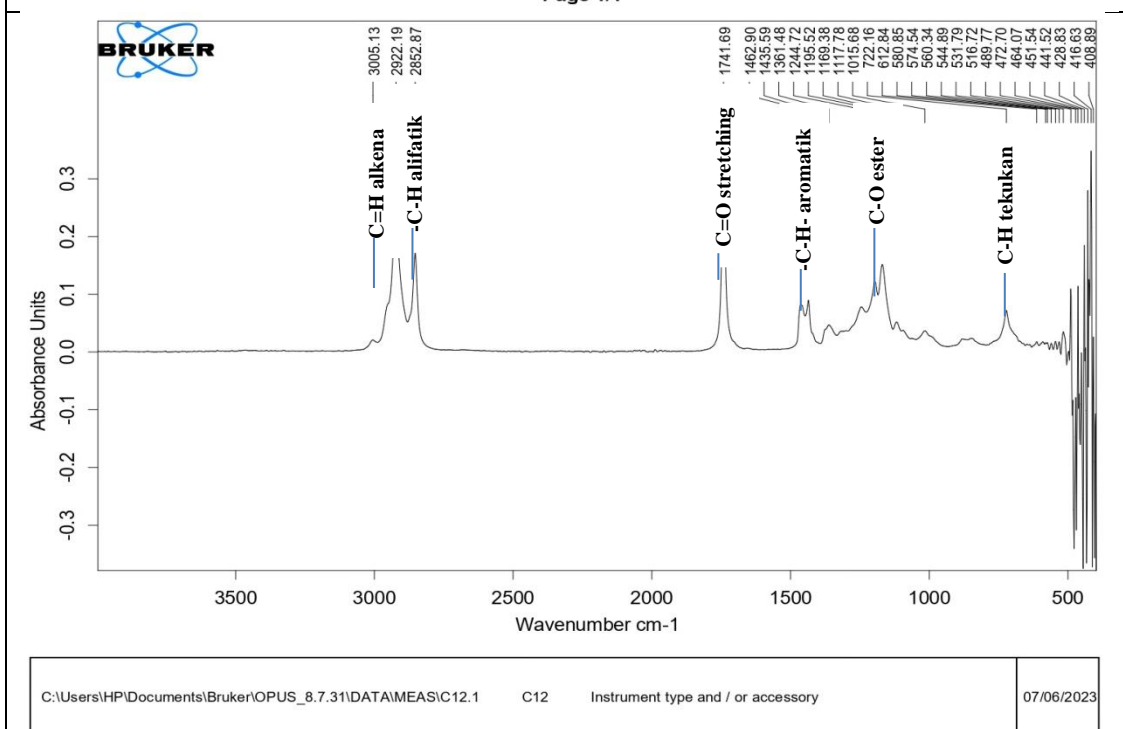
Instrument type and / or accessory

22/05/202

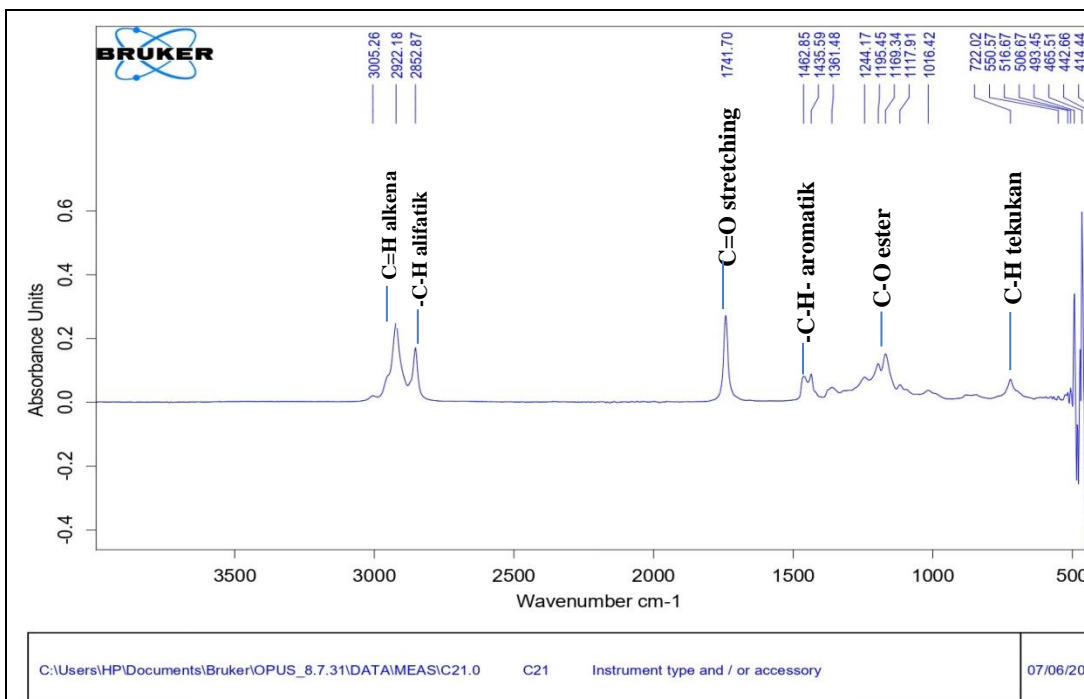
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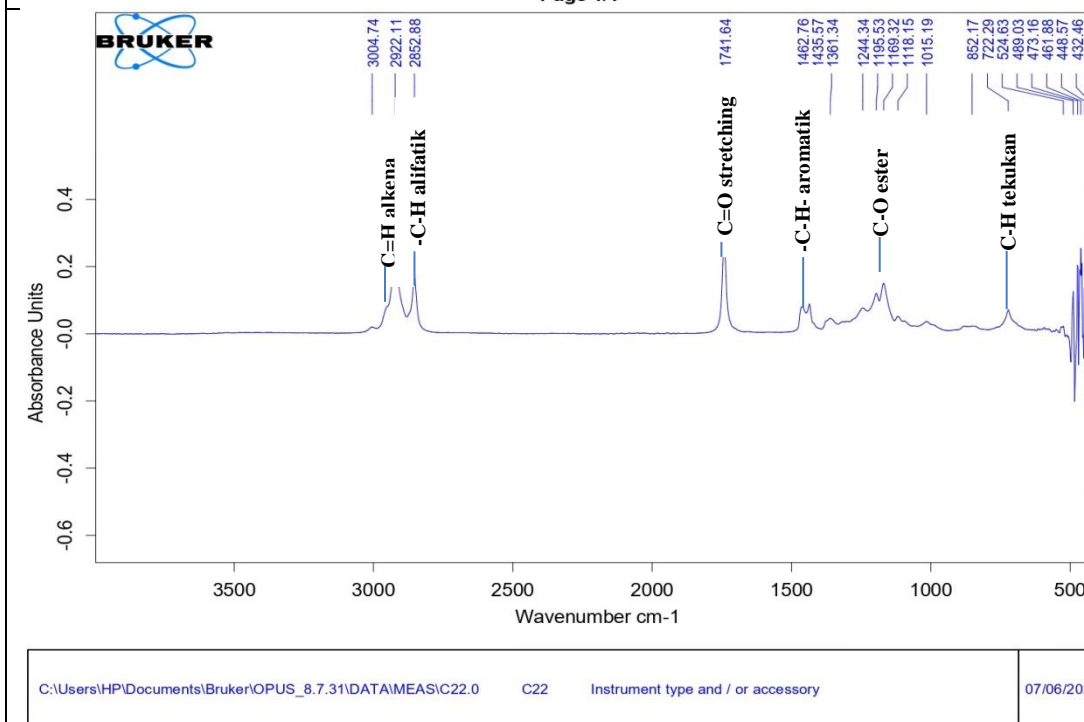
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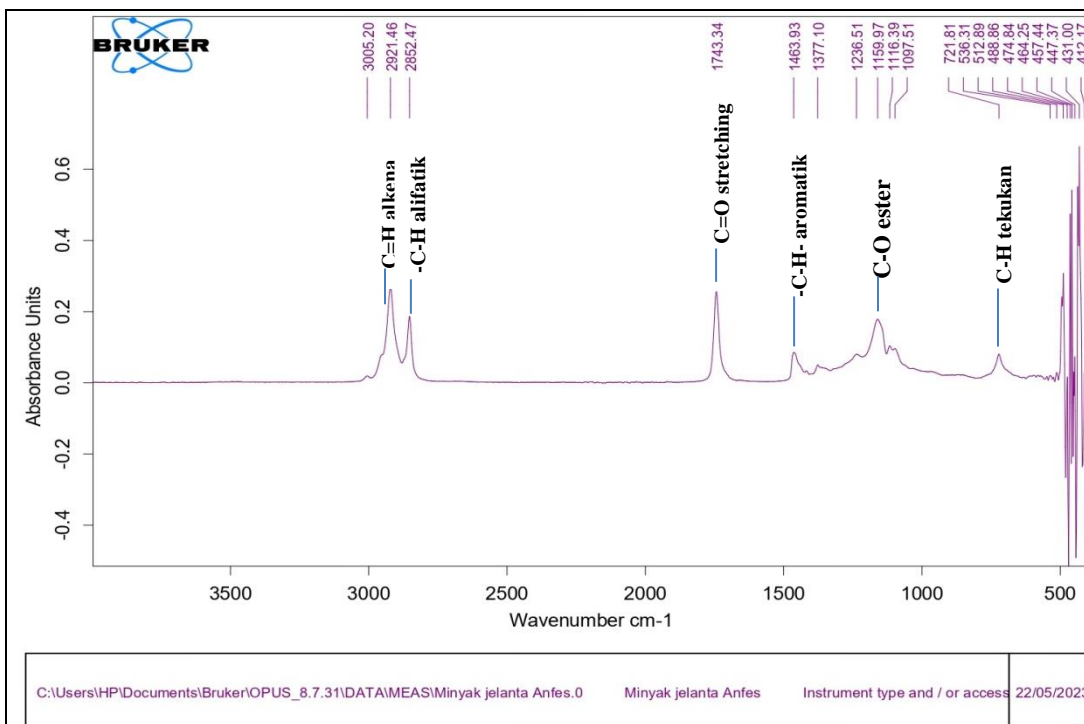
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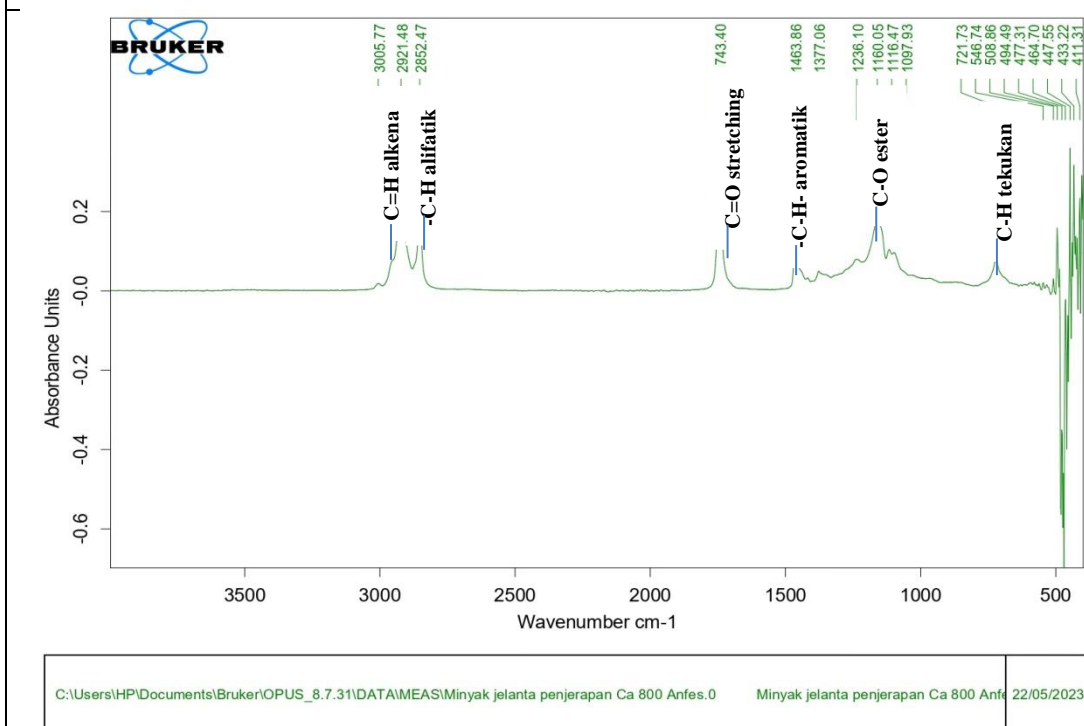
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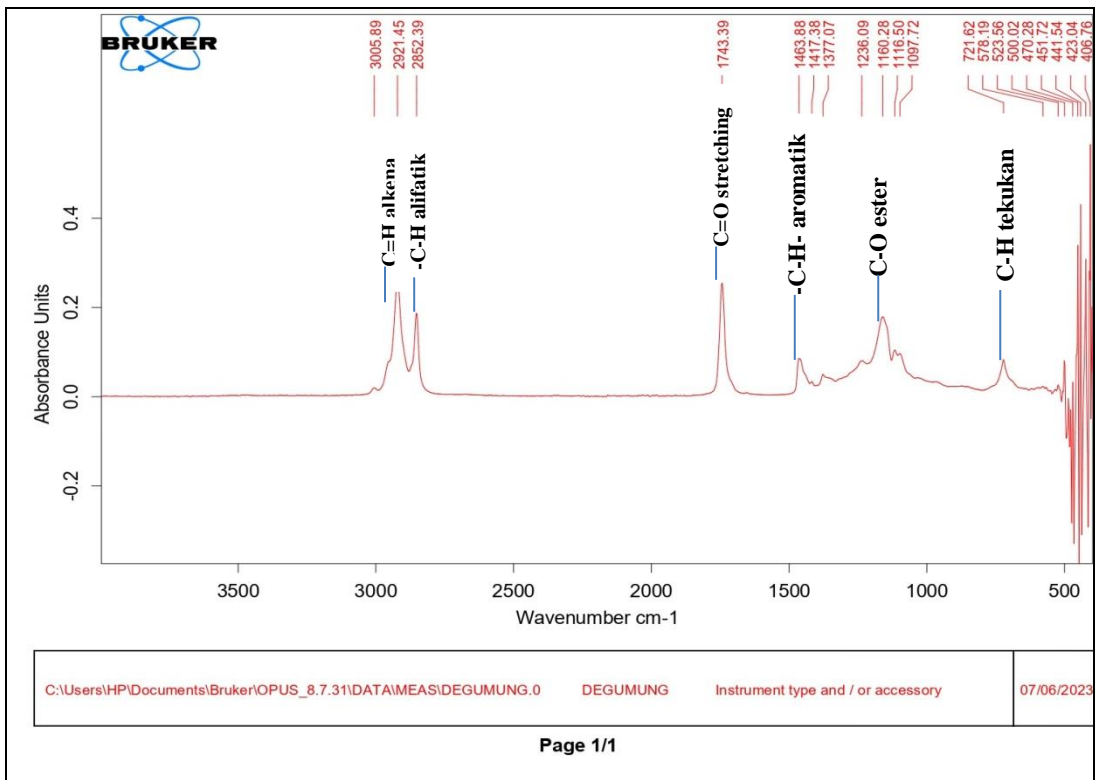
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LAMPIRAN D BIODATA PENULIS



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Hobi : Memasak
Motto : Pikiran negatif tidak akan pernah membawa
Anda ke kehidupan yang positif. Maka selalu
berbaik- sangka kepada setiap hal didepanmu.

Riwayat Pendidikan

- SD Negeri Pasuruhan 04 Tahun 2008 – 2013
- SMP Negeri 03 Binangun Tahun 2013 – 2016
- SMA Negeri 01 Binangun Tahun 2016 – 2019
- Politeknik Negeri Cilacap Tahun 2019 – 2023