BENCHMARKING ACIDIC AND BASIC CATALYSIS FOR A ROBUST PRODUCTION OF BIOFUEL FROM WASTE COOKING OIL

Claudia Carlucci [1,*], Michael Andresini [1], Leonardo Degennaro [1] and Renzo Luisi [1,2]

[1] Department of Pharmacy - Drug Sciences, University of Bari "A. Moro" Via E. Orabona 4, Bari 70125, Italy; Flow Chemistry and Microreactor Technology FLAME-Lab.
[2] Institute for the Chemistry of OrganoMetallic Compounds (ICCOM), National Research Council (CNR), Via Orabona 4, Bari 70125, Italy.

E-mail: claudia.carlucci@uniba.it

Contents:

Figure S1 ^{1}H-NMR spectra of FAMEs from WCO olive oil (Table 2)

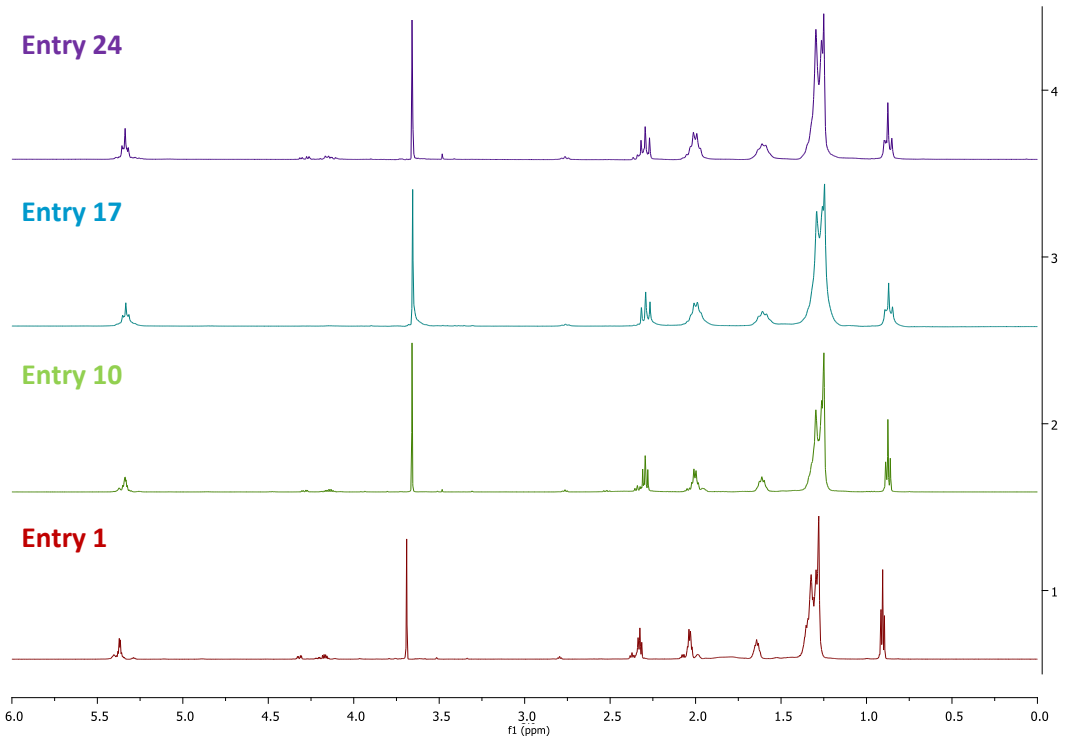


Figure S2 ^{1}H-NMR spectra of FAMEs from WCO seed oil (Table 2)

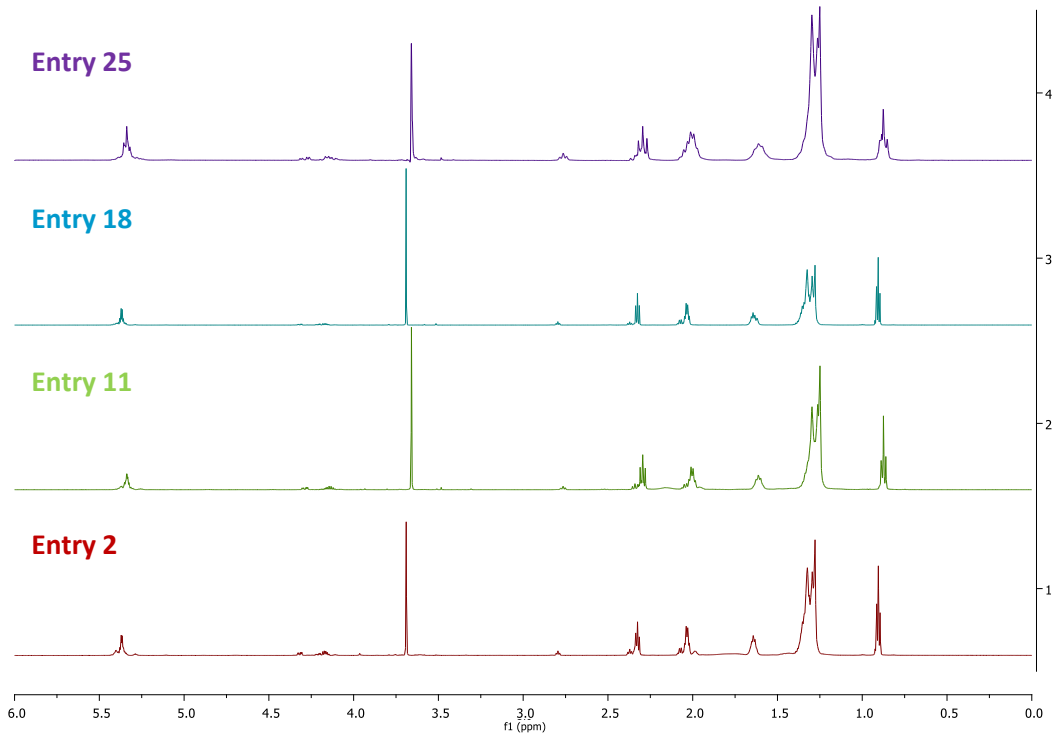


Figure S3 ^{1}H-NMR spectra of FAMEs from WCO mix 2 (Table 2)

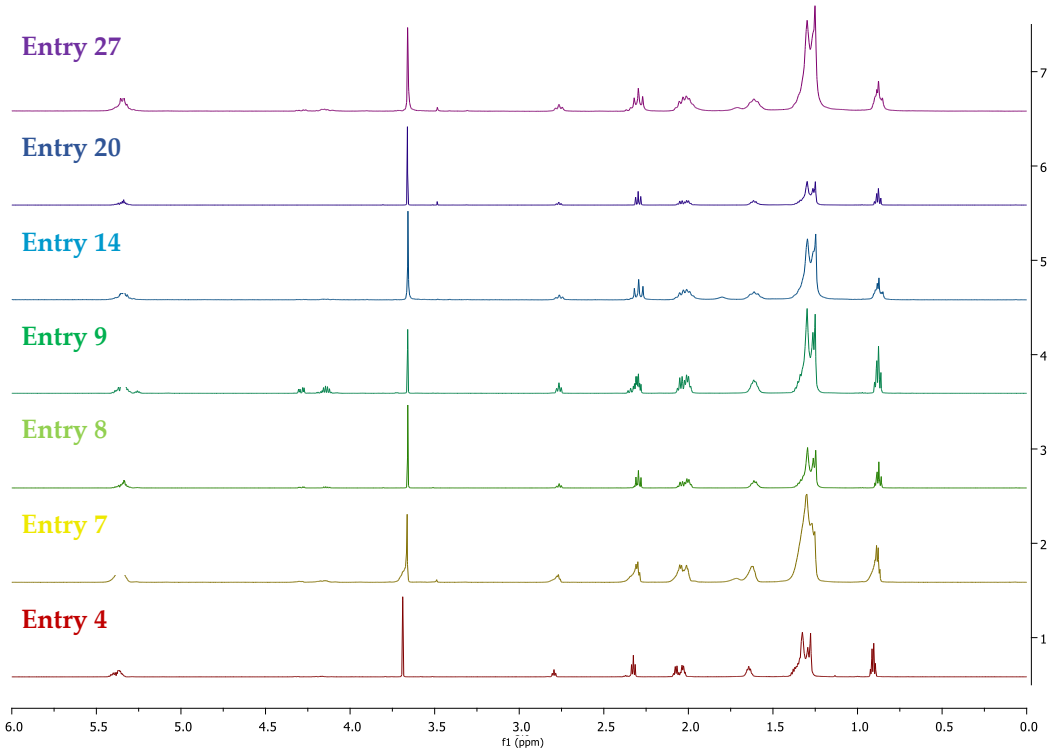


Figure S4 ^{1}H-NMR spectra of FAMEs from WCO mix 1 (Table 2)

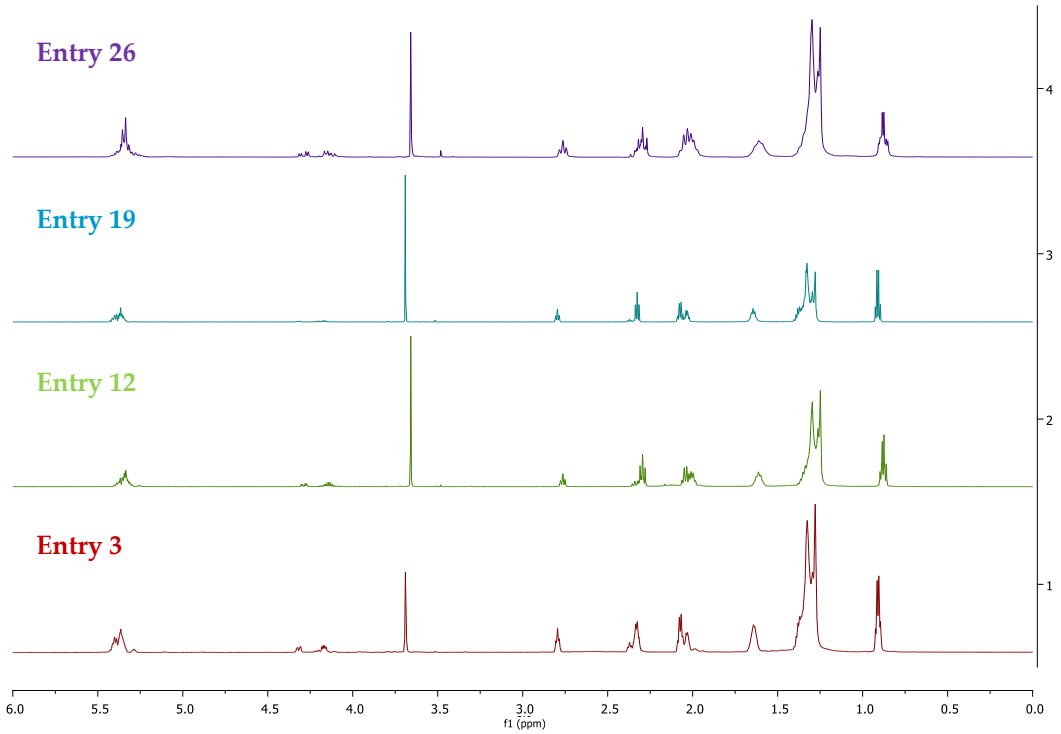


Figure S5 ^{1}H-NMR spectra of FAMEs from WCO mix 3 (Table 2)

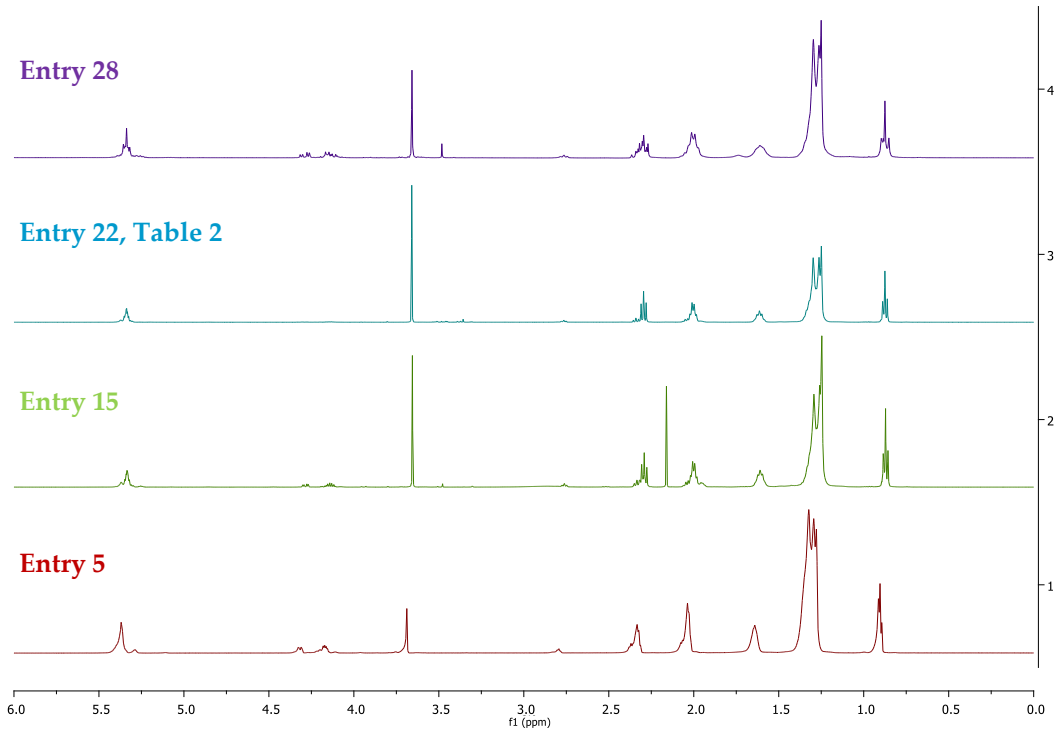


Figure S6 ^{1}H-NMR spectra of FAMEs from WCO mix 4 (Table 2)

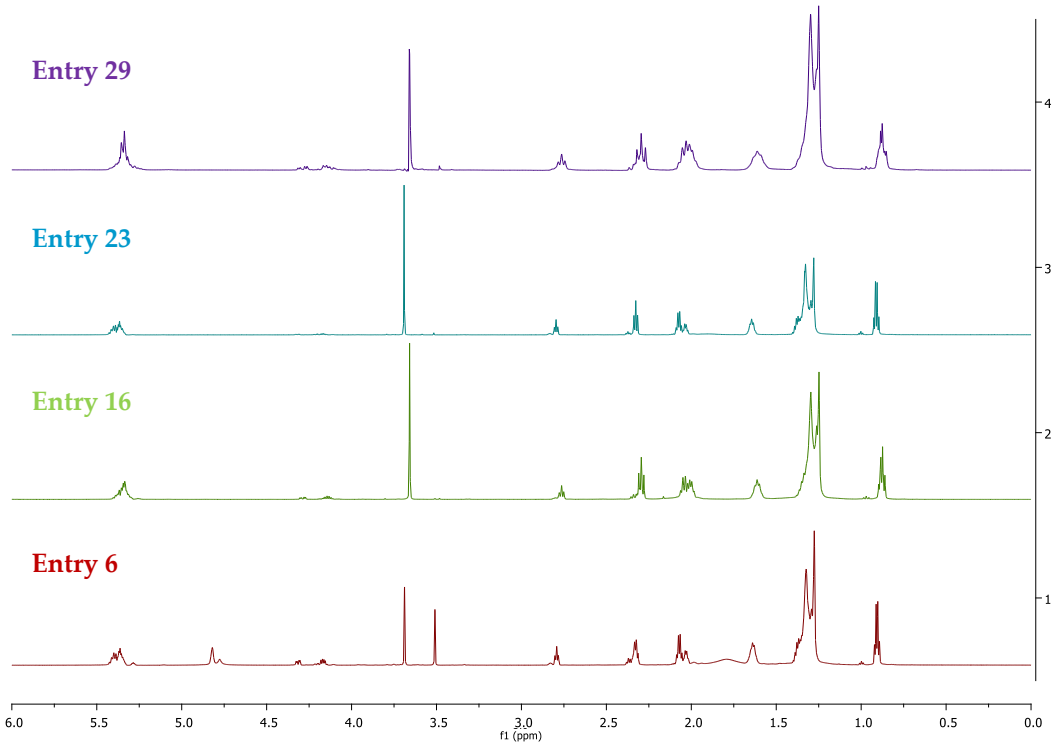


Figure S7 ^{1}H-NMR spectra of FAMEs from WCO mix 2 (Table 3)

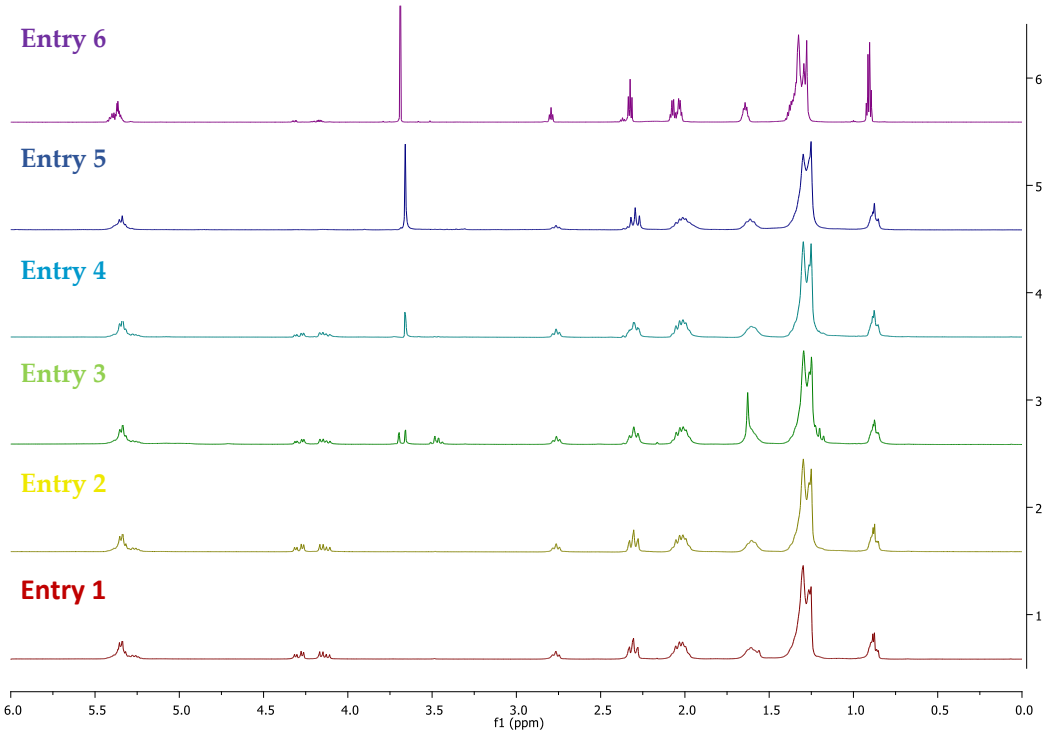


Figure S8 ^{1}H-NMR spectrum of standard biodiesel

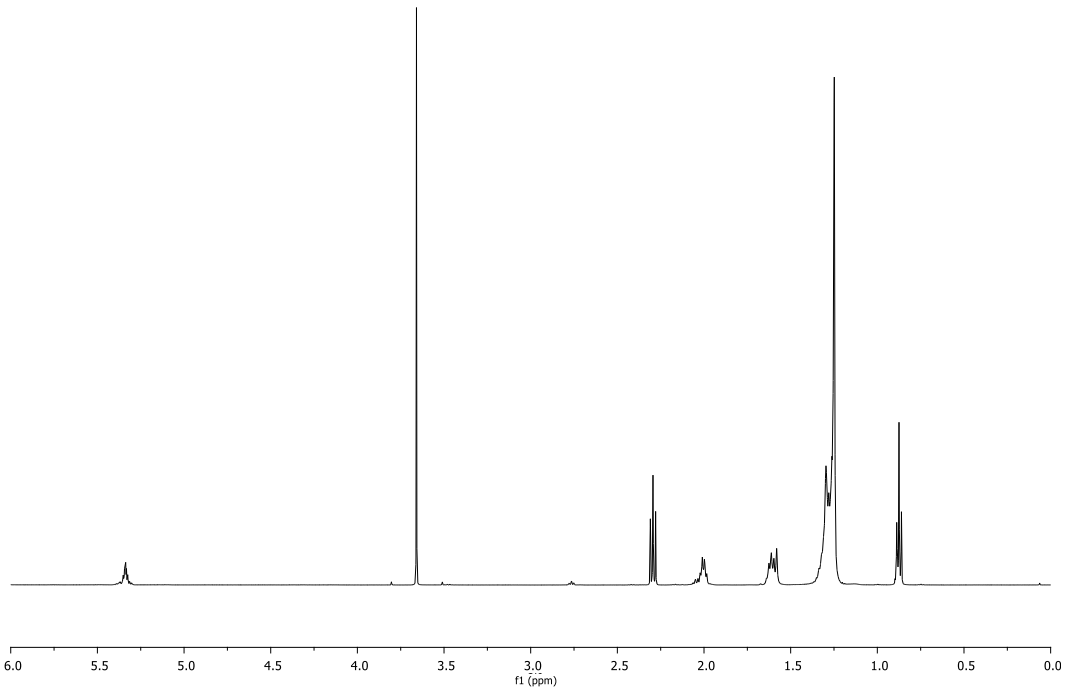


Figure S9 FT-IR spectrum of WCO olive oil

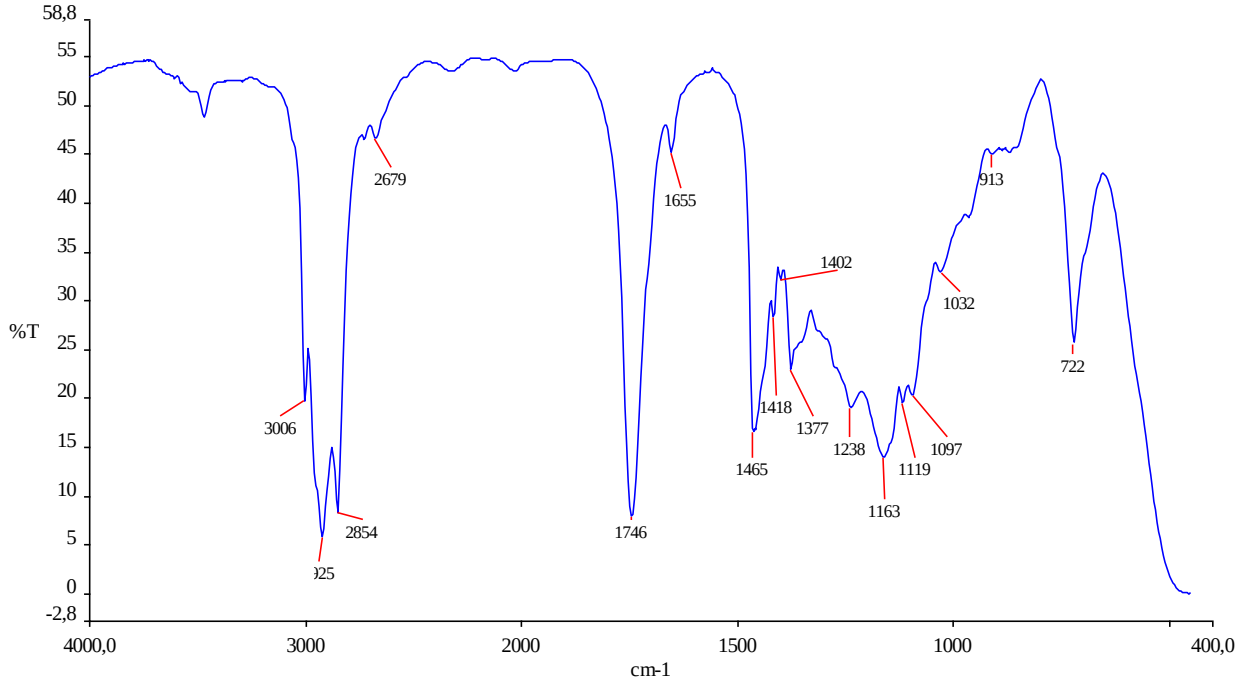


Figure S10 FT-IR spectrum of WCO seed oil

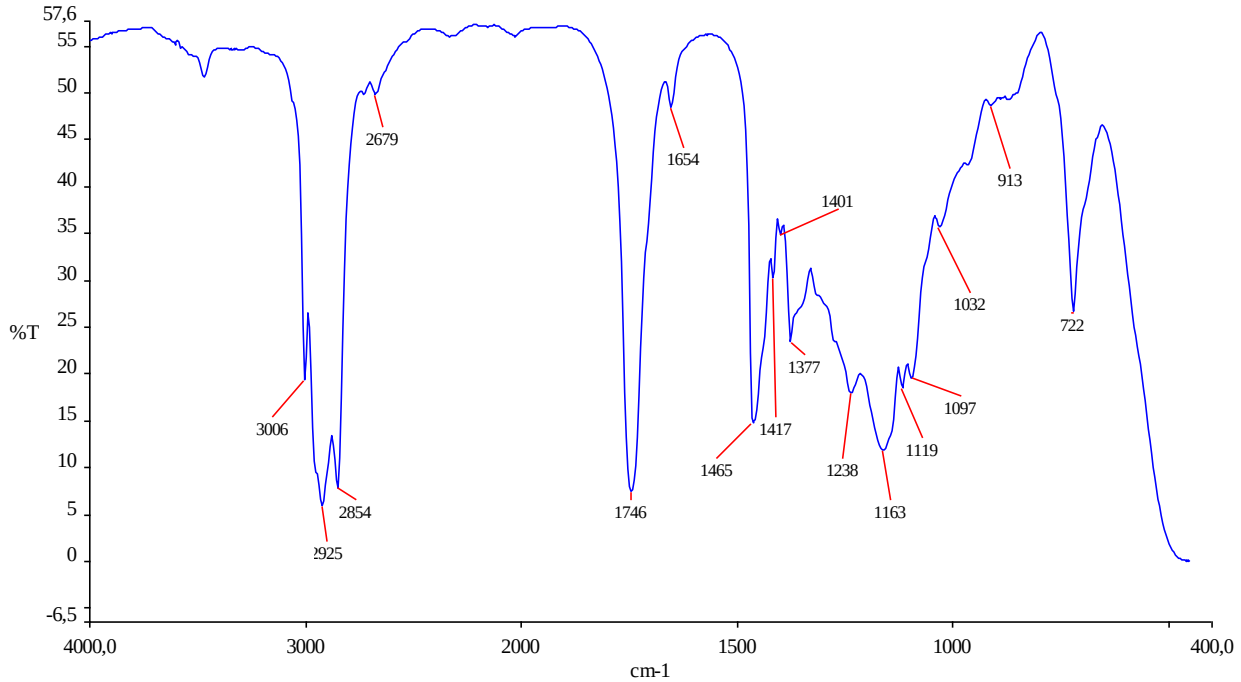


Figure S11 FT-IR spectrum of WCO mix 1

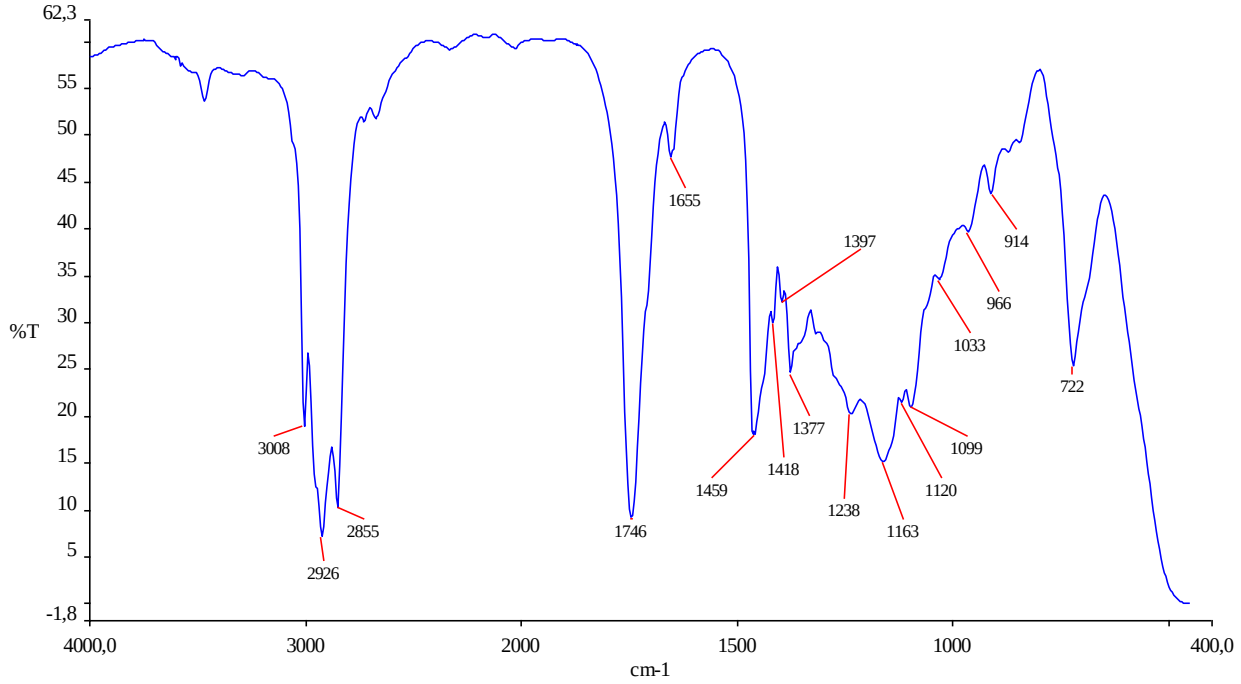


Figure S12 FT-IR spectrum of WCO mix 2

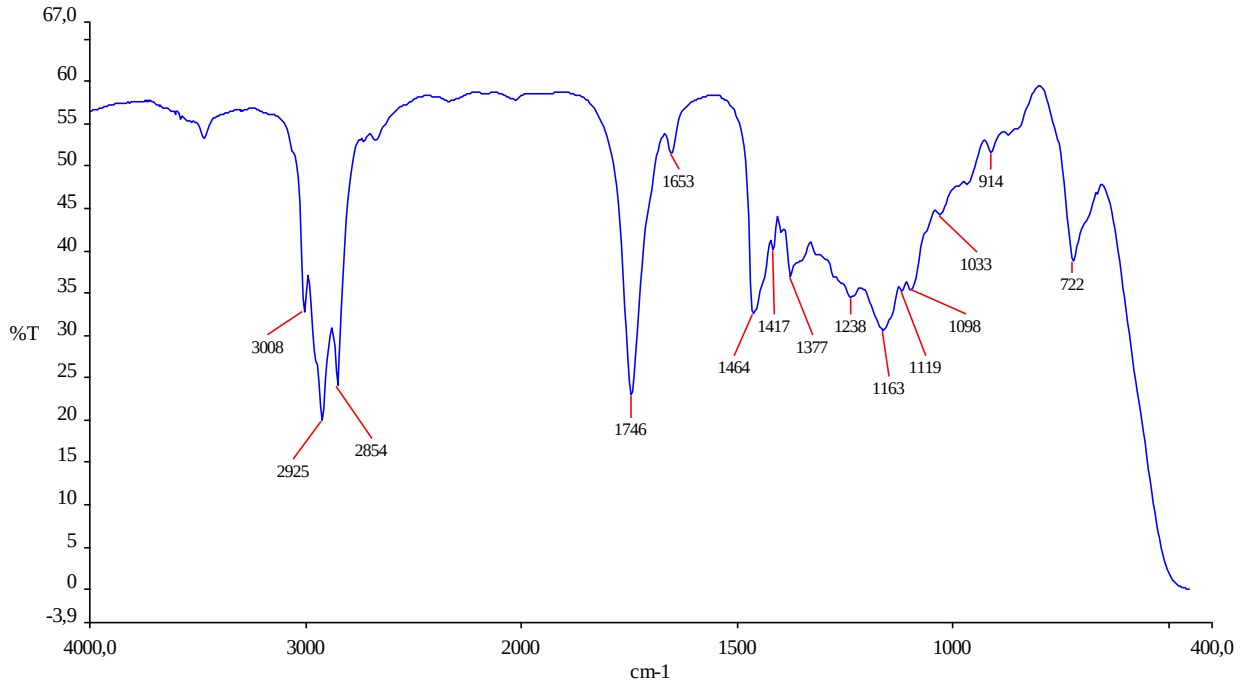


Figure S13 FT-IR spectrum of WCO mix 3

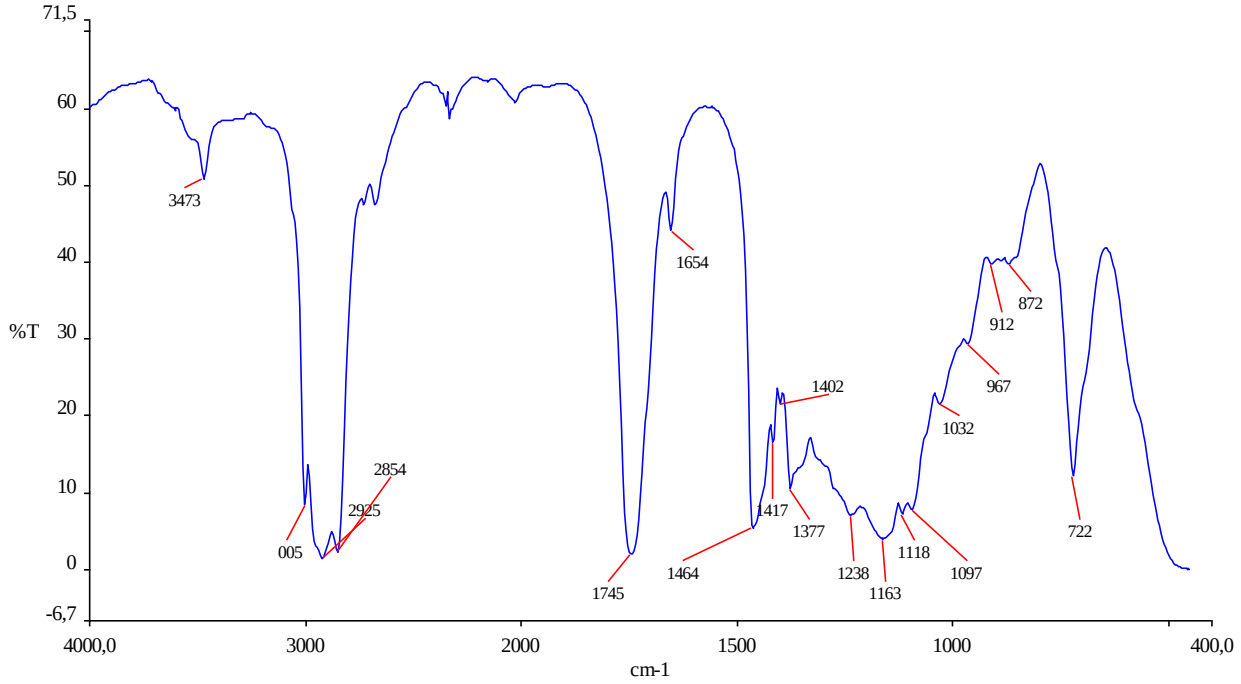


Figure S14 FT-IR spectrum of WCO mix 4

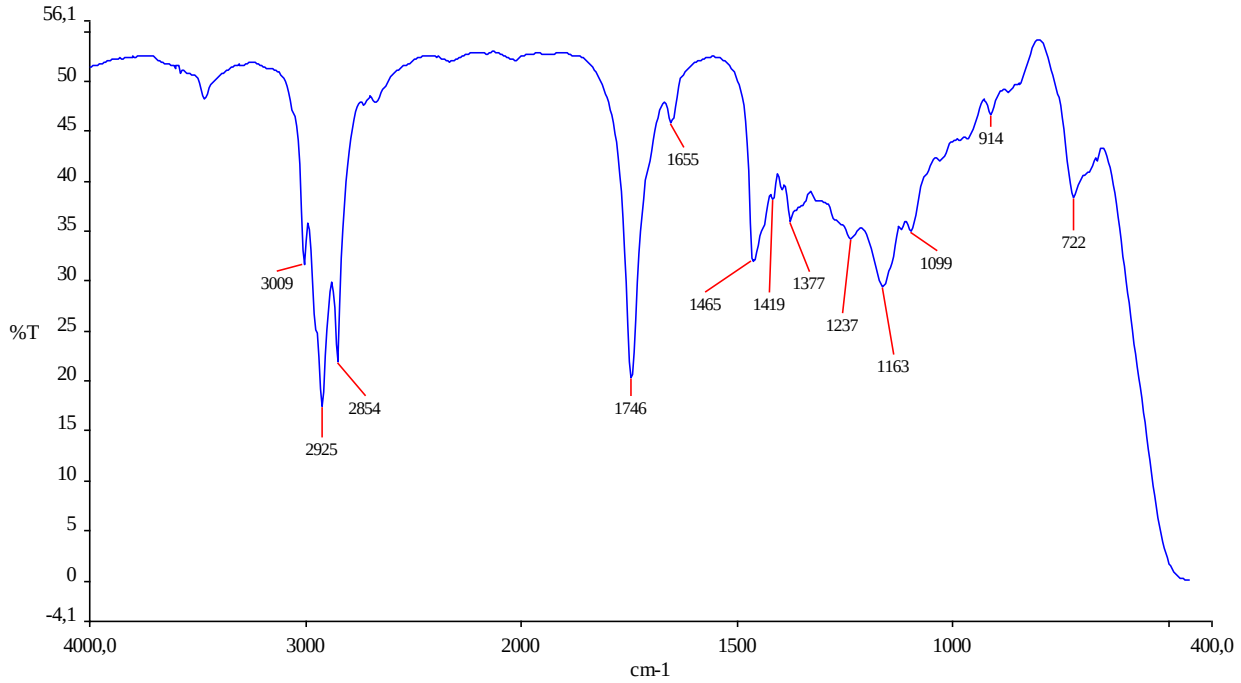


Figure S15 FT-IR spectrum of Entry 1 (Table 1)

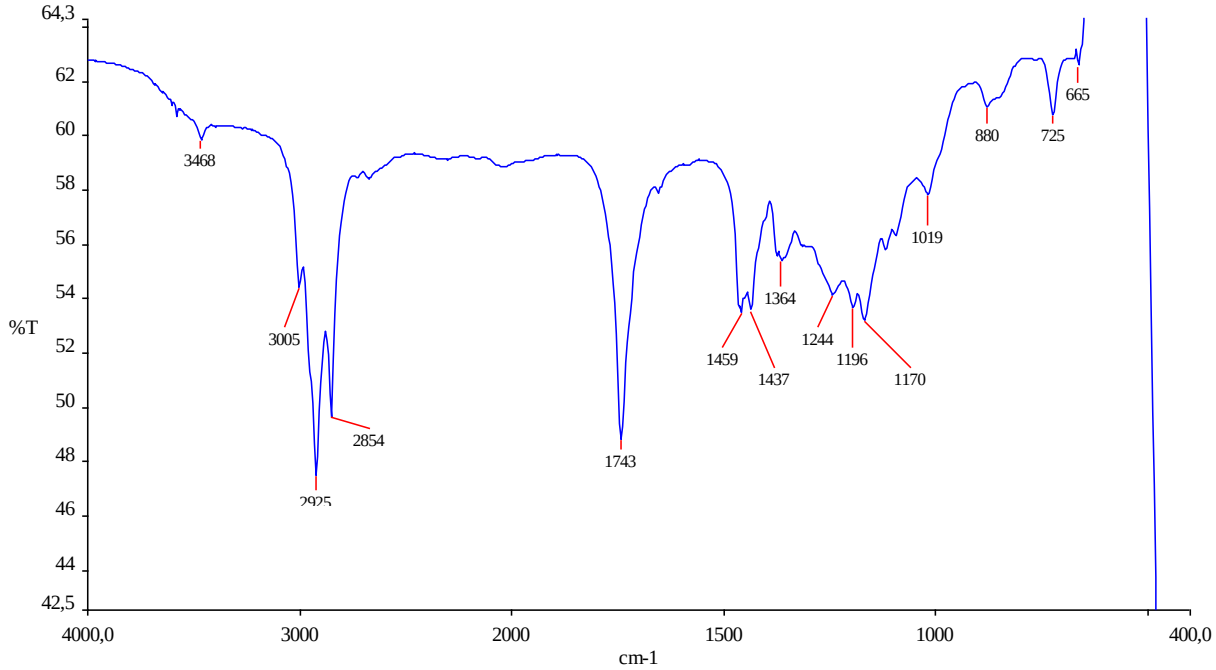


Figure S16 FT-IR spectrum of Entry 2 (Table 1)

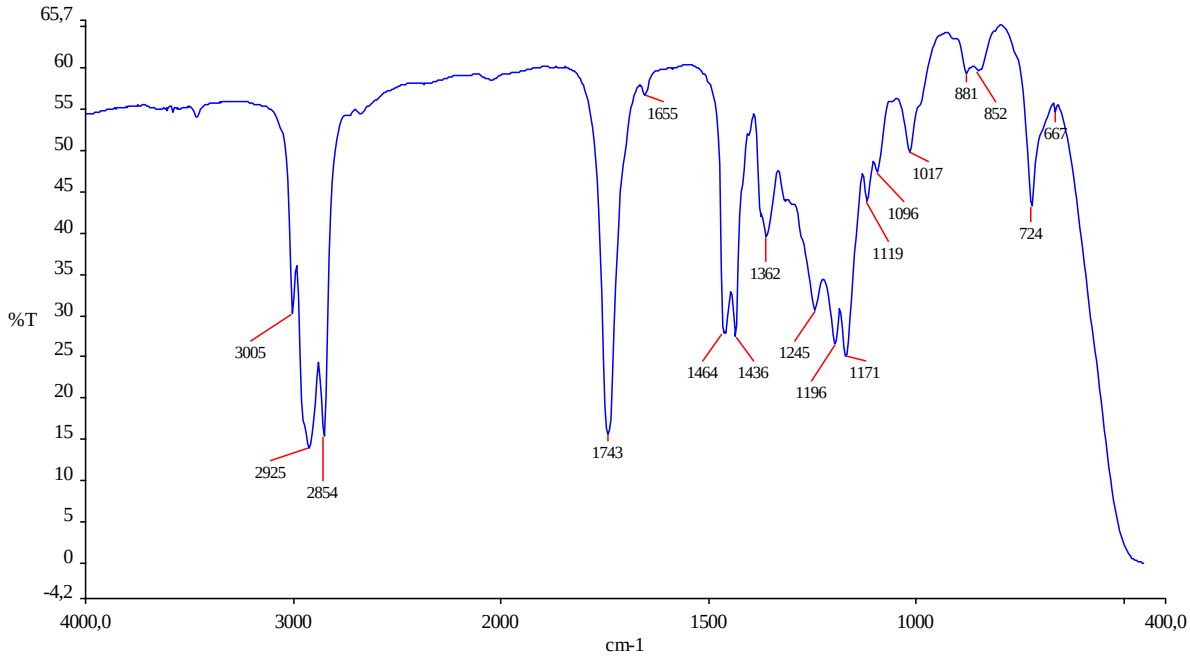


Figure S17 FT-IR spectrum of Entry 3 (Table 1)

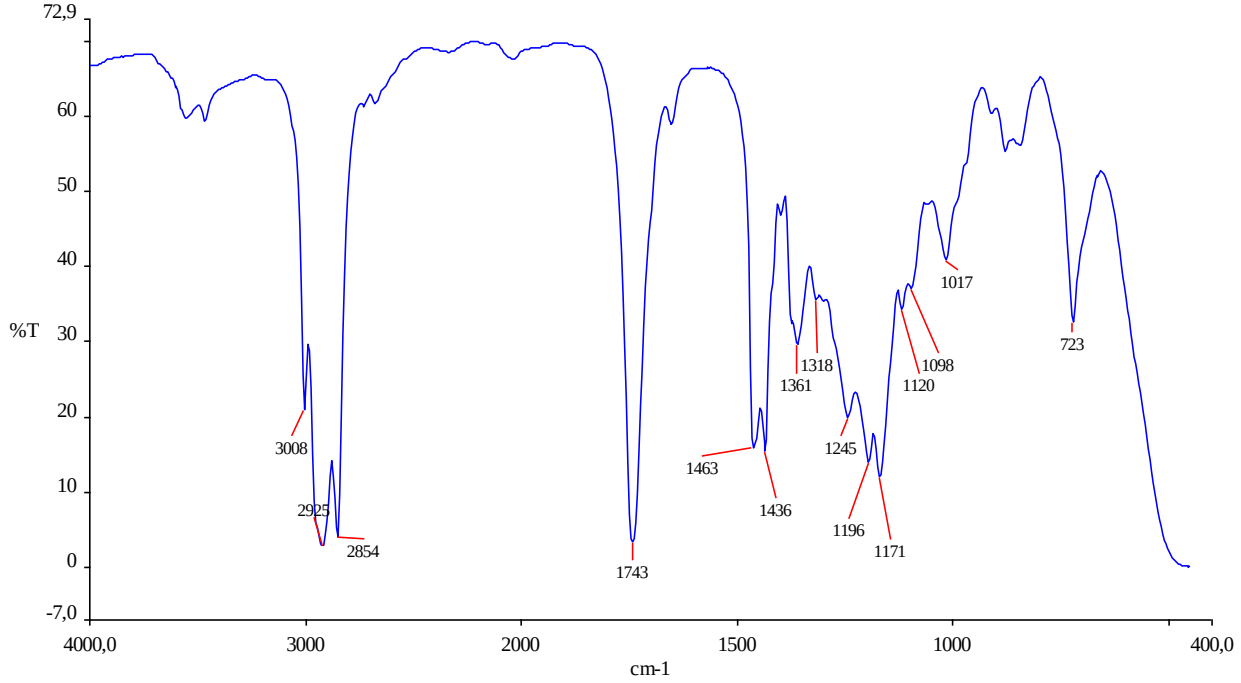


Figure S18 FT-IR spectrum of Entry 4 (Table 1)

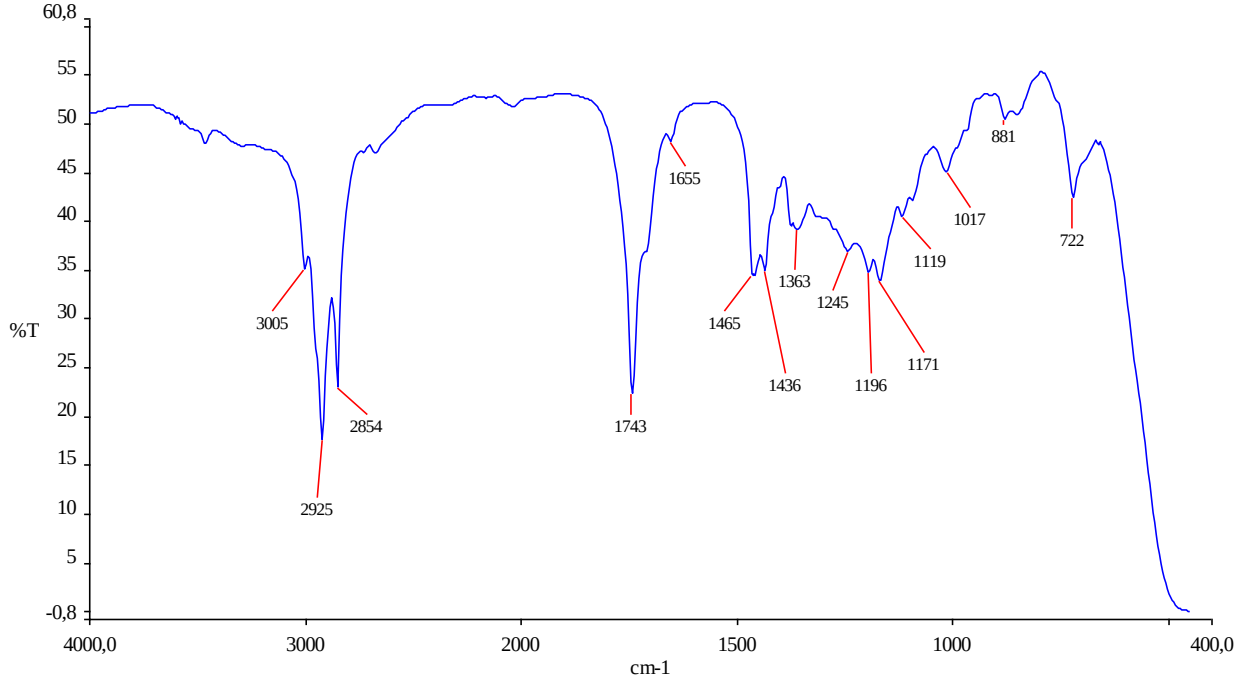


Figure S19 FT-IR spectrum of Entry 5 (Table 1)

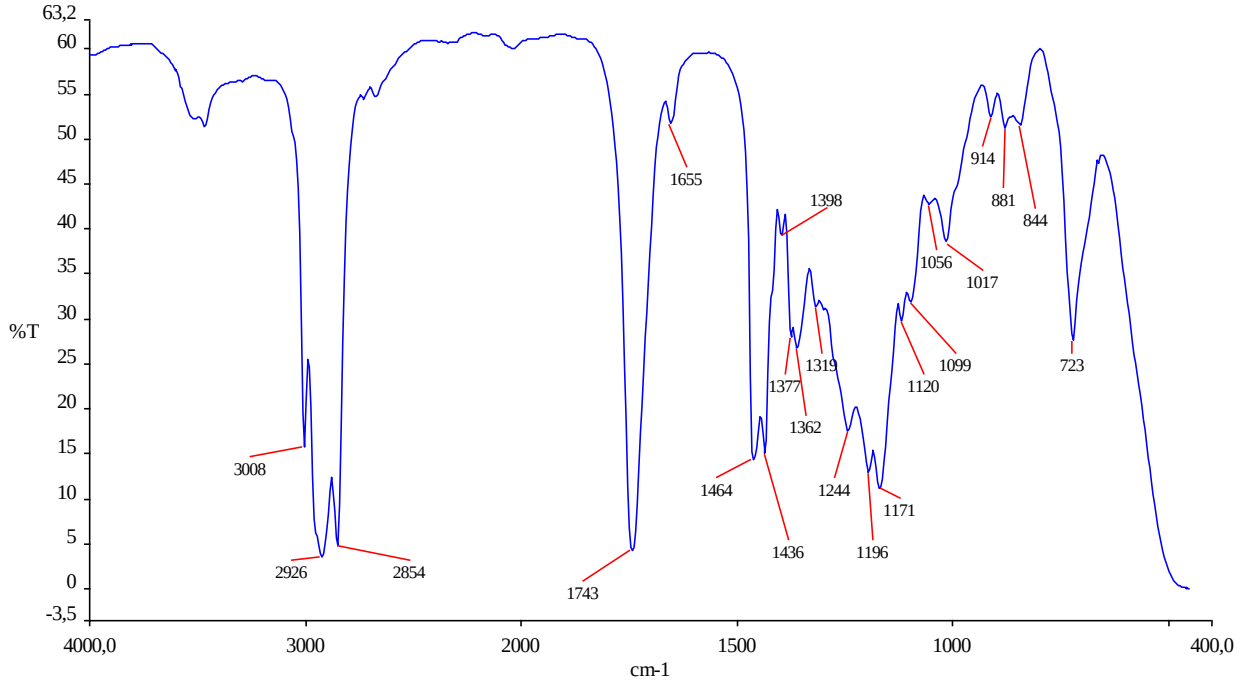


Figure S20 FT-IR spectrum of Entry 6 (Table 1)

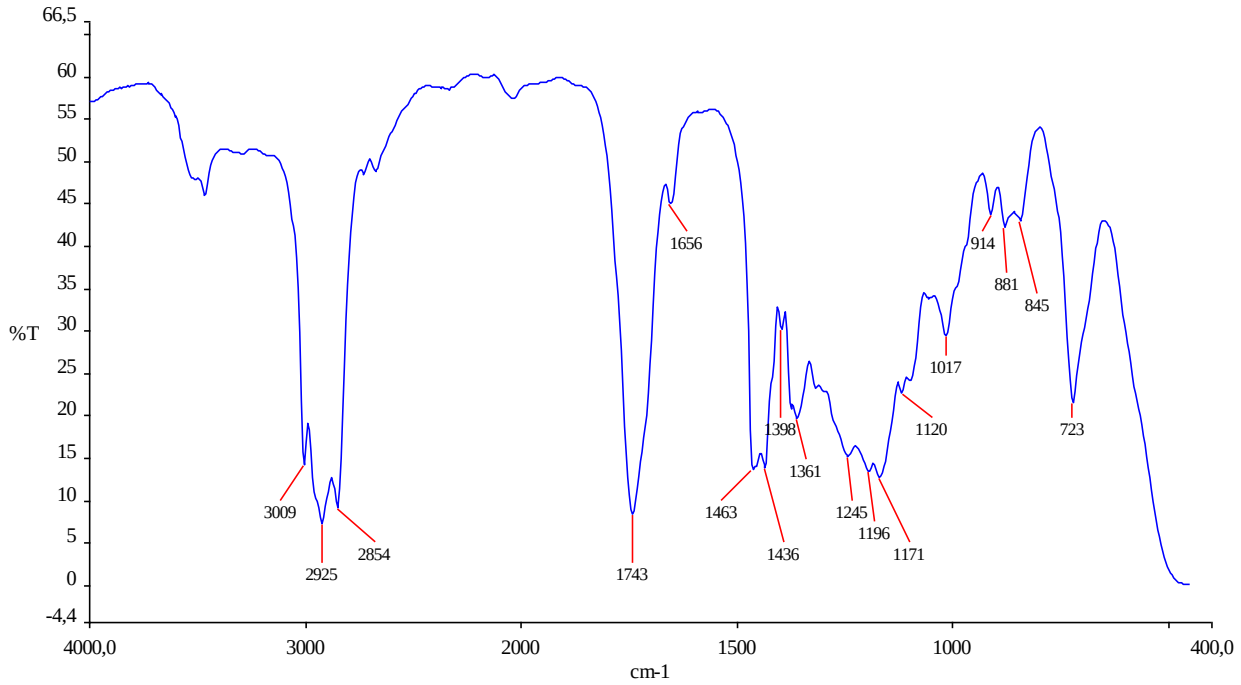
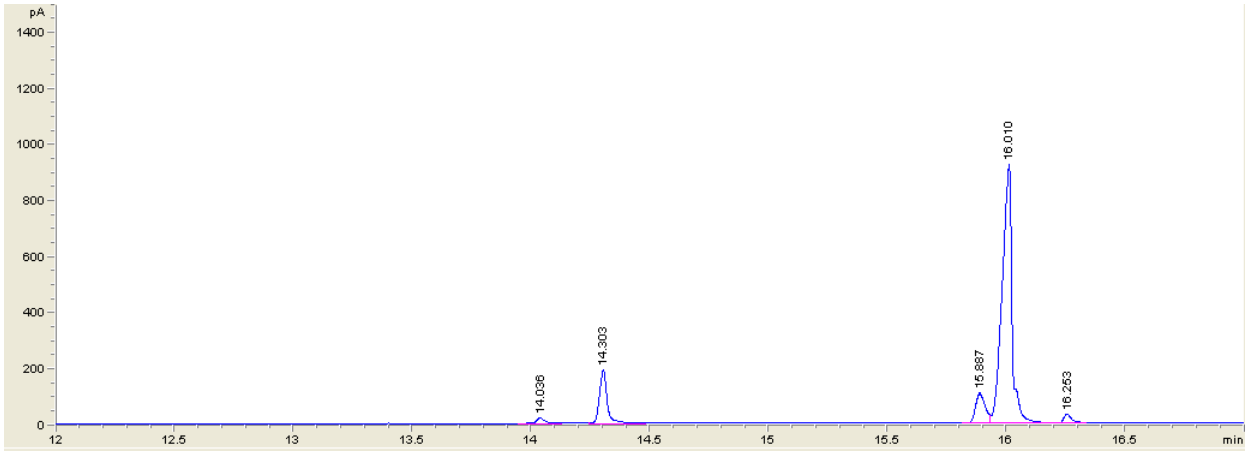
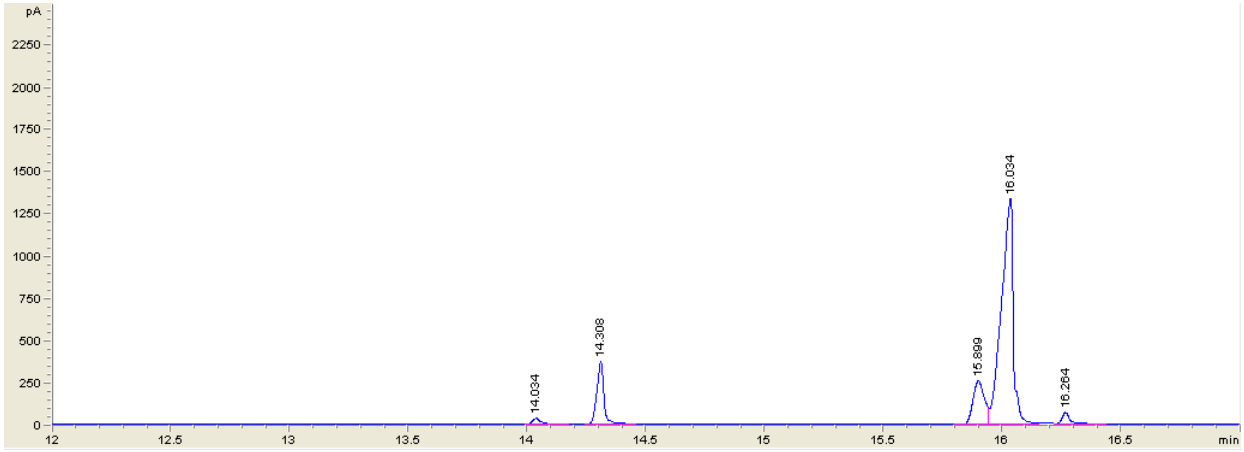


Figure S21 Chromatogram of Entry 1 (Table 5)



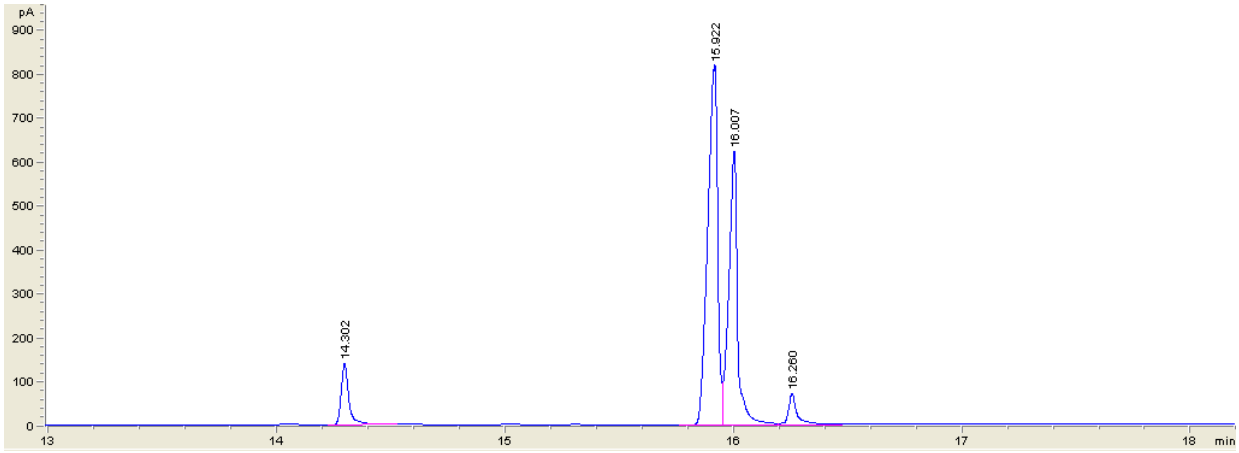
#	Time	Area	Height	Width	Area%	Symmetry
1	14.036	51.2	18.5	0.0394	1.441	0.696
2	14.303	436	192.4	0.0337	12.284	0.871
3	15.887	308.8	107.1	0.0409	8.701	0.736
4	16.01	2670.8	923	0.0378	75.255	1.954
5	16.253	82.3	33.2	0.0359	2.319	0.617

Figure S22 Chromatogram of Entry 2 (Table 5)



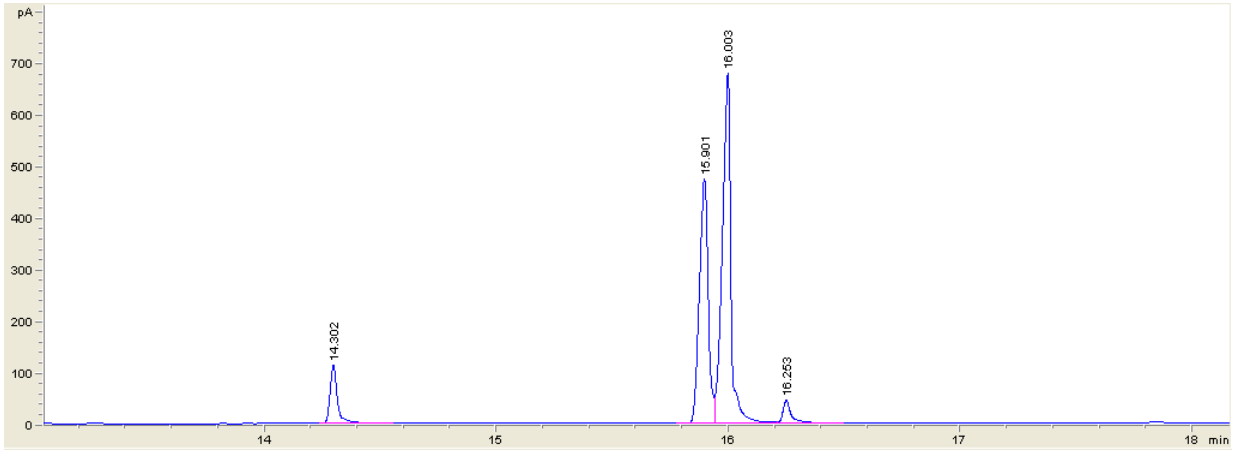
#	Time	Area	Height	Width	Area%	Symmetry
1	14.034	85.9	34.8	0.0346	1.324	0.655
2	14.308	779.8	374.6	0.0305	12.015	1.127
3	15.899	871.7	258.5	0.0438	13.430	0.893
4	16.034	4586	1336	0.044	70.655	3.052
5	16.264	167.1	68.1	0.0354	2.574	0.591
6	38.658	1.7E-1	5.1E-2	0.0396	0.003	0.316

Figure S23 Chromatogram of Entry 3 (Table 5)



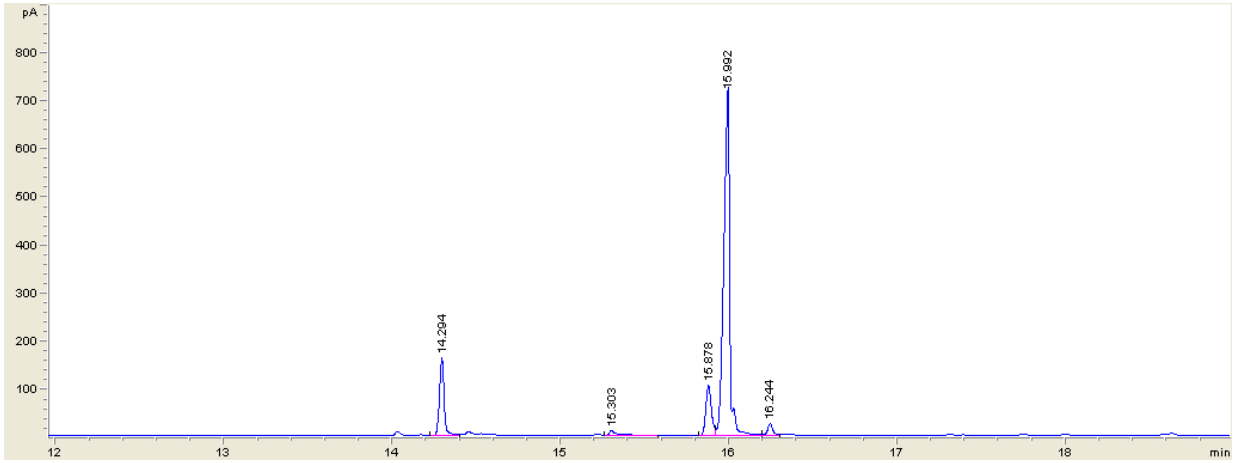
#	Time	Area	Height	Width	Area%	Symmetry
1	14.302	321.8	137.5	0.0341	6.908	0.696
2	15.922	2486	817.2	0.0395	53.366	2.305
3	16.007	1659.2	621.8	0.0371	35.618	1.348
4	16.26	191.3	70.5	0.0379	4.108	0.592

Figure S24 Chromatogram of Entry 4 (Table 5)



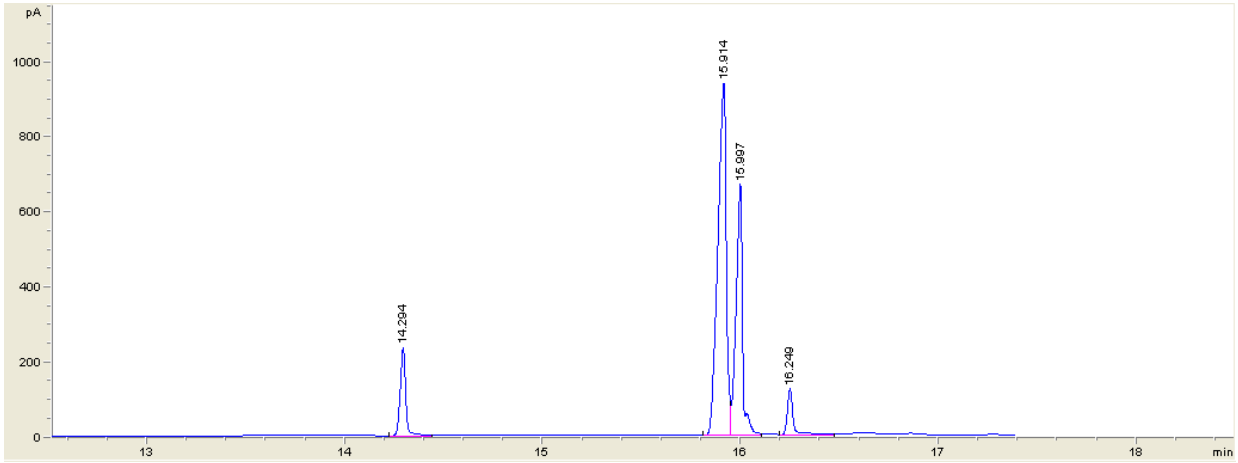
#	Time	Area	Height	Width	Area%	Symmetry
1	14.302	252.4	113.6	0.0299	7.484	0.731
2	15.901	1250.2	473.6	0.0363	37.064	1.218
3	16.003	1754.6	678.8	0.0342	52.017	1.622
4	16.253	115.8	44.1	0.0349	3.434	0.525

Figure S25 Chromatogram of Entry 5 (Table 5)



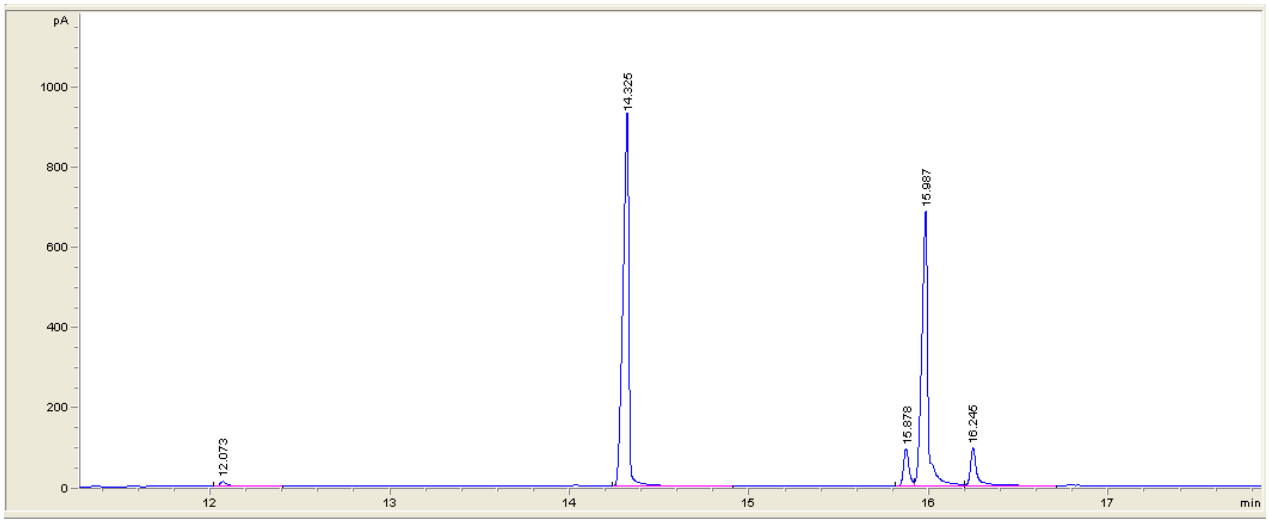
#	Time	Area	Height	Width	Area%	Symmetry
1	14.294	319.5	161.7	0.03	13.046	0.97
2	15.303	58.8	11	0.0696	2.400	0.267
3	15.878	248.9	104.3	0.0358	10.163	0.847
4	15.992	1760.4	711.5	0.0379	71.875	1.682
5	16.244	61.6	25.1	0.0366	2.515	0.797

Figure S26 Chromatogram of Entry 6 (Table 5)



#	Time	Area	Height	Width	Area%	Symmetry
1	14.294	453.4	234	0.0296	9.027	0.979
2	15.914	2800.8	937.4	0.0449	55.759	2.011
3	15.997	1500.1	667.8	0.0322	29.864	1.531
4	16.249	268.7	122.7	0.0326	5.350	0.659

Figure S27 Chromatogram of Standard Biodiesel sample



#	Time	Area	Height	Width	Area%	Symmetry
1	12.073	40.2	12.6	0.0454	0.928	0.351
2	14.325	2158.9	926.4	0.0362	49.779	1.865
3	15.878	198.8	92.9	0.032	4.584	0.795
4	15.987	1661.5	687.5	0.0352	38.311	1.294
5	16.245	277.5	95.7	0.0408	6.399	0.456

Table S1 GC parameters

Ramp	°C/min	Final T (°C)	Hold min
1	-	80	1
2	10	150	7
3	10	250	10