

Supplementary Materials

Table S1. Experimental design (Central composite) for each oil and each lipase

a) Sunflower oil

1) CRL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	34	9.6	32.5	6.1
2	17	9.0	40.0	10.3
3	37	7.5	32.5	88.2
4	21	9.6	32.5	6.7
5	30	9.0	40.0	10.3
6	38	7.5	32.5	87.5
7	32	7.5	43.1	34.1
8	10	7.5	32.5	92.1
9	29	9.0	25.0	7.7
10	14	6.0	25.0	12.4
11	25	7.5	32.5	91.1
12	24	7.5	32.5	89.0
13	12	7.5	32.5	89.3
14	18	7.5	21.9	20.3
15	11	7.5	32.5	89.6
16	35	7.5	32.5	92.1
17	3	9.0	25.0	7.6
18	7	5.4	32.5	50.7
19	39	7.5	32.5	89.3
20	15	6.0	40.0	92.6
21	36	7.5	32.5	87.2
22	8	9.6	32.5	7.1
23	27	6.0	25.0	17.9
24	13	7.5	32.5	92.1
25	31	7.5	21.9	20.7
26	26	7.5	32.5	93.2
27	2	6.0	40.0	93.7
28	6	7.5	43.1	35.9
29	5	7.5	21.9	21.6
30	22	7.5	32.5	89.3
31	1	6.0	25.0	15.1
32	33	5.4	32.5	48.3
33	23	7.5	32.5	89.6
34	9	7.5	32.5	93.1
35	19	7.5	43.1	32.0
36	4	9.0	40.0	10.2
37	28	6.0	40.0	92.2
38	20	5.4	32.5	51.0
39	16	9.0	25.0	7.9

2) PFL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	3	6.0	45.0	12.0
2	36	8.0	35.0	7.2
3	29	6.0	45.0	12.4
4	25	8.0	35.0	5.2
5	34	8.0	49.1	4.8
6	12	8.0	35.0	6.9
7	39	8.0	35.0	6.2
8	2	10.0	25.0	7.3
9	26	8.0	35.0	7.8
10	1	6.0	25.0	15.0
11	5	5.2	35.0	21.0
12	32	10.8	35.0	5.5
13	28	10.0	25.0	5.6
14	4	10.0	45.0	9.5
15	22	8.0	35.0	7.0
16	27	6.0	25.0	12.7
17	31	5.2	35.0	21.5
18	30	10.0	45.0	5.9
19	19	10.8	35.0	6.7
20	10	8.0	35.0	4.1
21	13	8.0	35.0	6.2
22	21	8.0	49.1	7.5
23	14	6.0	25.0	12.9
24	9	8.0	35.0	6.0
25	16	6.0	45.0	12.7
26	11	8.0	35.0	6.2
27	24	8.0	35.0	6.7
28	37	8.0	35.0	7.3
29	15	10.0	25.0	5.0
30	8	8.0	49.1	5.2
31	18	5.2	35.0	17.4
32	38	8.0	35.0	7.1
33	6	10.8	35.0	5.6
34	17	10.0	45.0	6.5
35	7	8.0	20.9	3.2
36	33	8.0	20.9	1.4
37	23	8.0	35.0	6.0
38	35	8.0	35.0	6.5
39	20	8.0	20.9	1.8

3) RML

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	28	9.0	25.0	1.5
2	10	7.5	32.5	39.2
3	8	7.5	43.1	36.3
4	20	7.5	21.9	24.0
5	9	7.5	32.5	37.5
6	36	7.5	32.5	37.2
7	14	6.0	25.0	23.2
8	37	7.5	32.5	34.2
9	11	7.5	32.5	31.2
10	39	7.5	32.5	30.7
11	12	7.5	32.5	41.3
12	33	7.5	21.9	27.8
13	31	5.4	32.5	22.4
14	7	7.5	21.9	21.6
15	38	7.5	32.5	38.7
16	1	6.0	25.0	24.6
17	22	7.5	32.5	35.4
18	27	6.0	25.0	23.9
19	3	6.0	40.0	28.2
20	15	9.0	25.0	1.8
21	32	9.6	32.5	1.8
22	21	7.5	43.1	32.6
23	5	5.4	32.5	18.3
24	17	9.0	40.0	1.9
25	6	9.6	32.5	1.7
26	13	7.5	32.5	36.0
27	29	6.0	40.0	28.3
28	18	5.4	32.5	23.7
29	35	7.5	32.5	37.0
30	30	9.0	40.0	2.0
31	23	7.5	32.5	40.0
32	4	9.0	40.0	2.0
33	19	9.6	32.5	1.9
34	16	6.0	40.0	29.2
35	24	7.5	32.5	36.0
36	26	7.5	32.5	39.0
37	2	9.0	25.0	1.8
38	25	7.5	32.5	42.0
39	34	7.5	43.1	48.0

b. Hempseed oil

1) CRL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	24	7.5	32.5	96.3
2	32	9.6	32.5	11.5
3	20	7.5	21.9	47.7
4	39	7.5	32.5	94.3
5	21	7.5	43.1	92.0
6	9	7.5	32.5	94.0
7	6	9.6	32.5	12.3
8	28	9.0	25.0	14.9
9	27	6.0	25.0	75.9
10	4	9.0	40.0	32.1
11	29	6.0	40.0	79.7
12	11	7.5	32.5	94.2
13	13	7.5	32.5	92.4
14	8	7.5	43.1	89.4
15	19	9.6	32.5	0.0
16	16	6.0	40.0	80.5
17	15	9.0	25.0	15.3
18	22	7.5	32.5	100.0
19	2	9.0	25.0	11.3
20	35	7.5	32.5	95.4
21	5	5.4	32.5	66.1
22	31	5.4	32.5	63.3
23	34	7.5	43.1	90.8
24	7	7.5	21.9	48.1
25	25	7.5	32.5	99.7
26	17	9.0	40.0	26.6
27	37	7.5	32.5	96.6
28	26	7.5	32.5	93.1
29	1	6.0	25.0	74.4
30	10	7.5	32.5	100.0
31	36	7.5	32.5	97.4
32	3	6.0	40.0	81.9
33	23	7.5	32.5	94.3
34	33	7.5	21.9	19.1
35	14	6.0	25.0	72.9
36	18	5.4	32.5	57.8
37	30	9.0	40.0	23.2
38	12	7.5	32.5	92.1
39	38	7.5	32.5	95.7

2) PFL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	16	6.0	45.0	44.2
2	12	8.0	35.0	51.9
3	22	8.0	35.0	48.8
4	9	8.0	35.0	54.4
5	35	8.0	35.0	52.4
6	30	10.0	45.0	32.5
7	27	6.0	25.0	46.2
8	20	8.0	20.9	42.3
9	2	10.0	25.0	40.1
10	21	8.0	49.1	50.8
11	37	8.0	35.0	49.8
12	10	8.0	35.0	51.9
13	5	5.2	35.0	44.2
14	17	10.0	45.0	36.1
15	4	10.0	45.0	33.0
16	28	10.0	25.0	38.1
17	15	10.0	25.0	37.3
18	33	8.0	20.9	42.7
19	39	8.0	35.0	50.3
20	34	8.0	49.1	52.3
21	7	8.0	20.9	42.2
22	29	6.0	45.0	51.2
23	26	8.0	35.0	50.8
24	13	8.0	35.0	52.4
25	18	5.2	35.0	36.6
26	36	8.0	35.0	49.3
27	32	10.8	35.0	21.4
28	14	6.0	25.0	45.2
29	19	10.8	35.0	22.4
30	6	10.8	35.0	23.4
31	1	6.0	25.0	43.7
32	24	8.0	35.0	48.8
33	3	6.0	45.0	47.3
34	38	8.0	35.0	51.3
35	31	5.2	35.0	41.7
36	23	8.0	35.0	52.4
37	25	8.0	35.0	51.9
38	8	8.0	49.1	50.9
39	11	8.0	35.0	54.9

3) RML

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	16	6.0	40.0	9.3
2	12	7.5	32.5	32.2
3	22	7.5	32.5	30.4
4	9	7.5	32.5	31.2
5	35	7.5	32.5	34.1
6	30	9.0	40.0	26.3
7	27	6.0	25.0	22.3
8	20	7.5	21.9	21.7
9	2	9.0	25.0	0.0
10	21	7.5	43.1	34.7
11	37	7.5	32.5	29.7
12	10	7.5	32.5	27.9
13	5	5.4	32.5	13.0
14	17	9.0	40.0	26.1
15	4	9.0	40.0	23.4
16	28	9.0	25.0	2.5
17	15	9.0	25.0	8.5
18	33	7.5	21.9	18.0
19	39	7.5	32.5	29.7
20	34	7.5	43.1	23.5
21	7	7.5	21.9	22.3
22	29	6.0	40.0	18.0
23	26	7.5	32.5	26.0
24	13	7.5	32.5	26.6
25	18	5.4	32.5	14.9
26	36	7.5	32.5	29.1
27	32	9.6	32.5	6.8
28	14	6.0	25.0	17.3
29	19	9.6	32.5	5.6
30	6	9.6	32.5	9.9
31	1	6.0	25.0	19.2
32	24	7.5	32.5	34.1
33	3	6.0	40.0	17.3
34	38	7.5	32.5	32.2
35	31	5.4	32.5	15.0
36	23	7.5	32.5	34.1
37	25	7.5	32.5	33.5
38	8	7.5	43.1	22.3
39	11	7.5	32.5	32.2

c. Linseed oil

1) CRL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	6	9.6	32.5	9.4
2	12	7.5	32.5	57.9
3	10	7.5	32.5	62.7
4	1	6.0	25.0	70.6
5	5	5.4	32.5	100.0
6	7	7.5	21.9	58.4
7	11	7.5	32.5	74.6
8	13	7.5	32.5	58.6
9	4	9.0	40.0	9.1
10	3	6.0	40.0	58.0
11	9	7.5	32.5	55.7
12	8	7.5	43.1	60.7
13	2	9.0	25.0	11.3
14	19	9.6	32.5	12.8
15	25	7.5	32.5	56.2
16	23	7.5	32.5	57.8
17	14	6.0	25.0	72.1
18	18	5.4	32.5	89.7
19	20	7.5	21.9	56.0
20	24	7.5	32.5	56.7
21	26	7.5	32.5	58.4
22	17	9.0	40.0	10.1
23	16	6.0	40.0	64.7
24	22	7.5	32.5	58.1
25	21	7.5	43.1	29.9
26	15	9.0	25.0	14.8
27	32	9.6	32.5	8.3
28	38	7.5	32.5	58.9
29	36	7.5	32.5	57.7
30	27	6.0	25.0	78.8
31	31	5.4	32.5	98.0
32	33	7.5	21.9	57.2
33	37	7.5	32.5	57.5
34	39	7.5	32.5	59.1
35	30	9.0	40.0	11.4
36	29	6.0	40.0	64.7
37	35	7.5	32.5	57.0
38	34	7.5	43.1	26.4
39	28	9.0	25.0	14.9

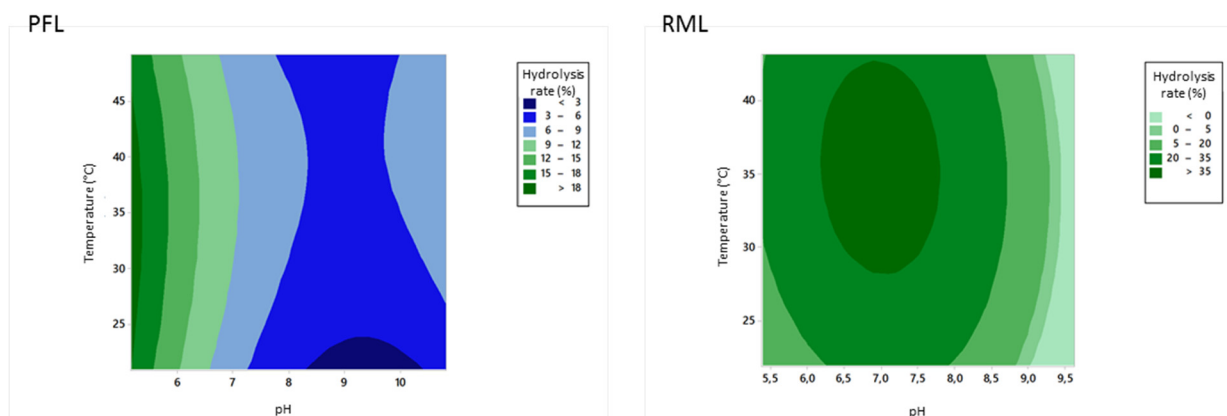
2) PFL

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	16	6.0	45.0	32.0
2	12	8.0	35.0	14.2
3	22	8.0	35.0	19.3
4	9	8.0	35.0	16.8
5	35	8.0	35.0	17.3
6	30	10.0	45.0	14.7
7	27	6.0	25.0	37.1
8	20	8.0	20.9	29.0
9	2	10.0	25.0	10.2
10	21	8.0	49.1	34.6
11	37	8.0	35.0	16.3
12	10	8.0	35.0	17.3
13	5	5.2	35.0	43.7
14	17	10.0	45.0	23.4
15	4	10.0	45.0	22.9
16	28	10.0	25.0	9.2
17	15	10.0	25.0	9.7
18	33	8.0	20.9	29.5
19	39	8.0	35.0	14.7
20	34	8.0	49.1	31.0
21	7	8.0	20.9	27.5
22	29	6.0	45.0	30.0
23	26	8.0	35.0	15.3
24	13	8.0	35.0	14.2
25	18	5.2	35.0	46.3
26	36	8.0	35.0	16.8
27	32	10.8	35.0	3.6
28	14	6.0	25.0	30.5
29	19	10.8	35.0	2.5
30	6	10.8	35.0	3.6
31	1	6.0	25.0	36.1
32	24	8.0	35.0	18.8
33	3	6.0	45.0	39.1
34	38	8.0	35.0	18.3
35	31	5.2	35.0	43.2
36	23	8.0	35.0	13.7
37	25	8.0	35.0	17.8
38	8	8.0	49.1	36.1
39	11	8.0	35.0	16.3

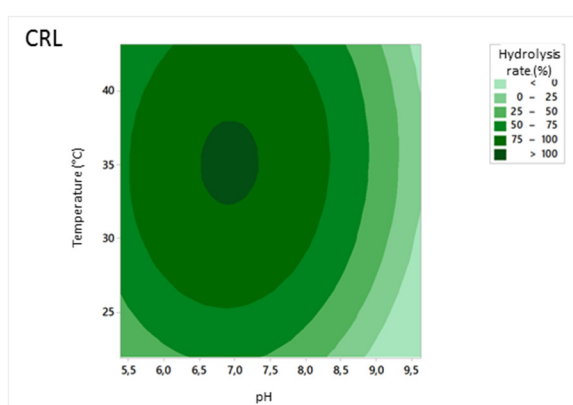
3) RML

Sample number (Standard Order)	Randomized Order	pH	Temperature (°C)	Hydrolysis rate (%)
1	16	6.0	40.0	42.2
2	12	7.5	32.5	28.3
3	22	7.5	32.5	28.8
4	9	7.5	32.5	28.3
5	35	7.5	32.5	28.5
6	30	9.0	40.0	2.5
7	27	6.0	25.0	40.2
8	20	7.5	21.9	34.2
9	2	9.0	25.0	10.2
10	21	7.5	43.1	27.3
11	37	7.5	32.5	28.1
12	10	7.5	32.5	28.6
13	5	5.4	32.5	27.5
14	17	9.0	40.0	3.1
15	4	9.0	40.0	1.9
16	28	9.0	25.0	11.6
17	15	9.0	25.0	7.8
18	33	7.5	21.9	23.9
19	39	7.5	32.5	29.0
20	34	7.5	43.1	28.6
21	7	7.5	21.9	29.7
22	29	6.0	40.0	32.6
23	26	7.5	32.5	28.8
24	13	7.5	32.5	28.3
25	18	5.4	32.5	25.7
26	36	7.5	32.5	28.3
27	32	9.6	32.5	3.7
28	14	6.0	25.0	28.0
29	19	9.6	32.5	3.4
30	6	9.6	32.5	2.2
31	1	6.0	25.0	29.5
32	24	7.5	32.5	28.0
33	3	6.0	40.0	37.6
34	38	7.5	32.5	28.5
35	31	5.4	32.5	30.0
36	23	7.5	32.5	28.8
37	25	7.5	32.5	28.5
38	8	7.5	43.1	28.1
39	11	7.5	32.5	28.6

a) *Sunflower oil*



b) *Hempseed oil*



c) *Linseed oil*

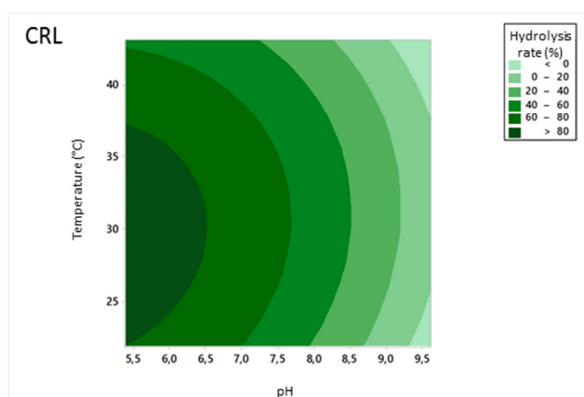
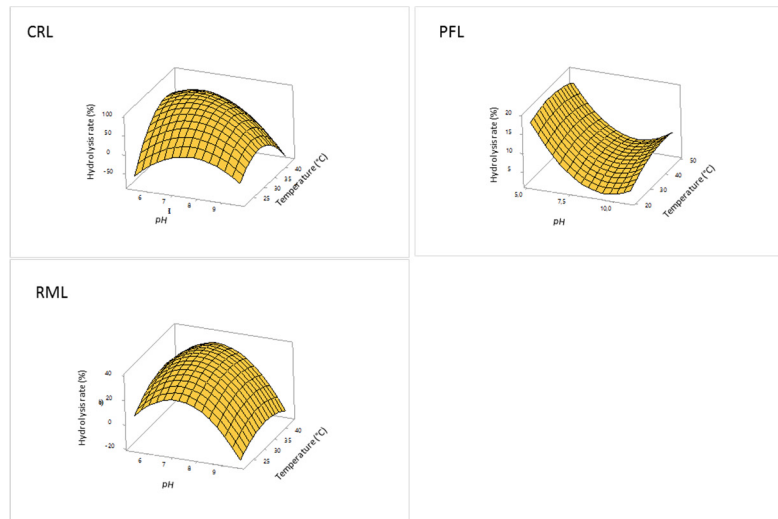
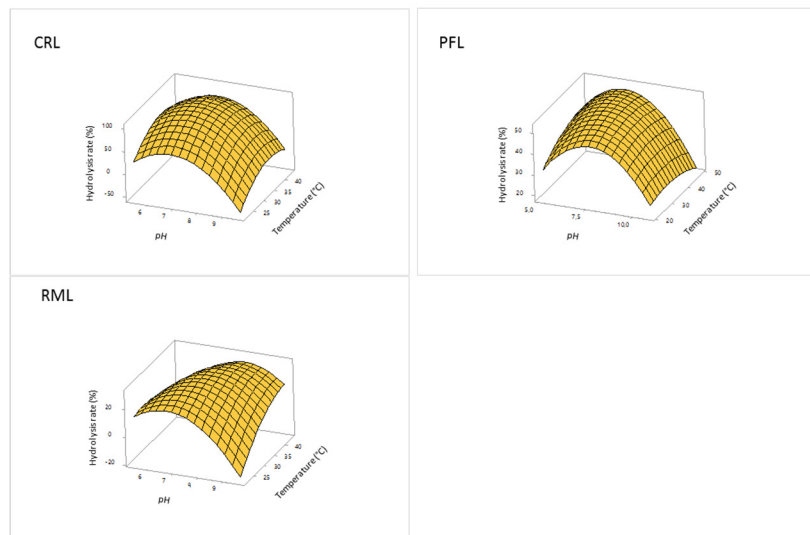


Figure S1. Contour plots of the hydrolysis rate (%) after lipolysis on sunflower oil (a) hempseed oil (b) and linseed oil (c), as a function of the temperature (T) and pH (H) for CRL, PFL and RML

a) Sunflower oil



b) Hempseed oil



c) Linseed oil

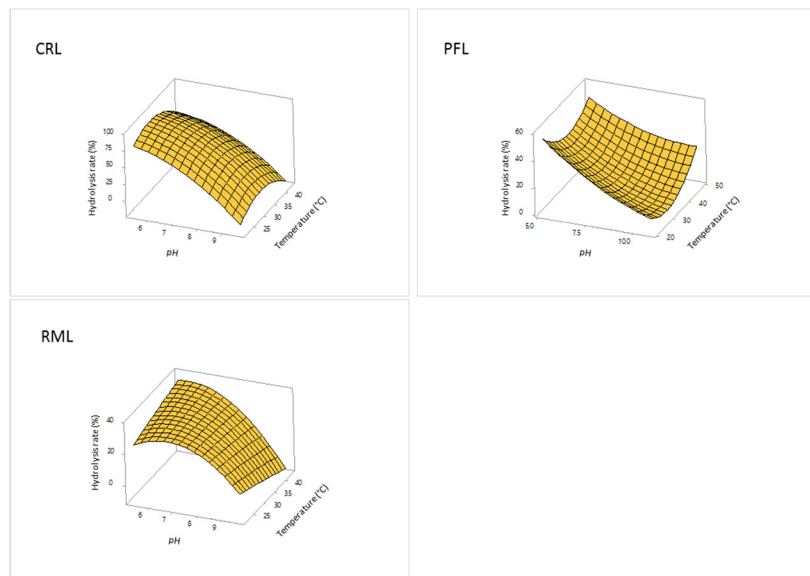


Figure S2. Three-dimensional (3D) response surface plots of the hydrolysis rate (%) after lipolysis on sunflower oil (a) hempseed oil (b) and linseed oil (c), as a function of the temperature (T) and pH (H) for CRL, PFL and RML

Table S2. Experimental design (Box-Behnken) for each oil with CRL

a. Sunflower oil

Sample number (Standard Order)	Randomized Order	Duration reaction (h)	Enzyme load (U)	Oil/aqueous ratio of the mixture (%)	Hydrolysis rate (%)
1	1	2	800	35	44.1
2	6	8	1900	20	62.5
3	7	2	1900	50	72.5
4	2	8	800	35	51.6
5	15	5	1900	35	93.7
6	45	5	1900	35	93.1
7	39	5	800	20	64.5
8	11	5	800	50	45.6
9	9	5	800	20	60.2
10	4	8	3000	35	48.4
11	40	5	3000	20	93.7
12	5	2	1900	20	58.7
13	21	8	1900	20	62.5
14	19	8	3000	35	63.3
15	17	8	800	35	49.3
16	31	2	800	35	36.1
17	8	8	1900	50	69.1
18	18	2	3000	35	92.0
19	26	5	800	50	35.8
20	36	8	1900	20	65.6
21	34	8	3000	35	46.1
22	12	5	3000	50	92.3
23	30	5	1900	35	93.4
24	22	2	1900	50	73.4
25	3	2	3000	35	91.7
26	42	5	3000	50	92.0
27	28	5	1900	35	96.0
28	10	5	3000	20	93.4
29	37	2	1900	50	77.1
30	13	5	1900	35	90.3
31	35	2	1900	20	66.8
32	20	2	1900	20	57.3
33	23	8	1900	50	80.8
34	38	8	1900	50	67.6
35	25	5	3000	20	93.1
36	43	5	1900	35	95.7
37	27	5	3000	50	93.7
38	24	5	800	20	69.3
39	29	5	1900	35	90.3
40	16	2	800	35	32.4
41	33	2	3000	35	91.7
42	32	8	800	35	60.2

43	41	5	800	50	48.4
44	14	5	1900	35	100.0
45	44	5	1900	35	90.3

b. Hempseed oil

Sample number (Standard Order)	Randomized Order	Duration reaction (h)	Enzyme load (U)	Oil/aqueous ratio of the mixture (%)	Hydrolysis rate (%)
1	38	8	1900	50	99.7
2	32	8	800	35	100.0
3	40	5	3000	20	98.6
4	36	8	1900	20	100.0
5	12	5	3000	50	75.1
6	15	5	1900	35	98.8
7	18	2	3000	35	69.9
8	31	2	800	35	39.1
9	6	8	1900	20	100.0
10	24	5	800	20	93.9
11	27	5	3000	50	100.0
12	45	5	1900	35	100.0
13	44	5	1900	35	100.0
14	5	2	1900	20	50.4
15	25	5	3000	20	100.0
16	7	2	1900	50	80.3
17	37	2	1900	50	73.3
18	42	5	3000	50	70.7
19	16	2	800	35	22.6
20	34	8	3000	35	77.1
21	14	5	1900	35	100.0
22	13	5	1900	35	93.9
23	4	8	3000	35	72.8
24	11	5	800	50	55.4
25	20	2	1900	20	50.4
26	9	5	800	20	83.5
27	26	5	800	50	60.9
28	28	5	1900	35	97.1
29	19	8	3000	35	71.6
30	2	8	800	35	95.9
31	23	8	1900	50	94.5
32	21	8	1900	20	100.0
33	10	5	3000	20	95.4
34	35	2	1900	20	48.7
35	30	5	1900	35	93.9
36	22	2	1900	50	69.9
37	3	2	3000	35	78.6
38	41	5	800	50	60.0
39	8	8	1900	50	95.1

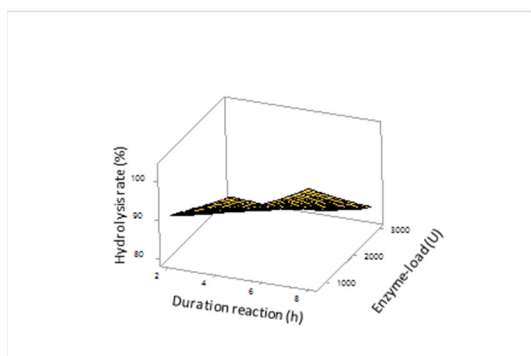
40	1	2	800	35	32.8
41	33	2	3000	35	73.0
42	17	8	800	35	93.0
43	43	5	1900	35	100.0
44	39	5	800	20	91.0
45	29	5	1900	35	94.5

c. Linseed oil

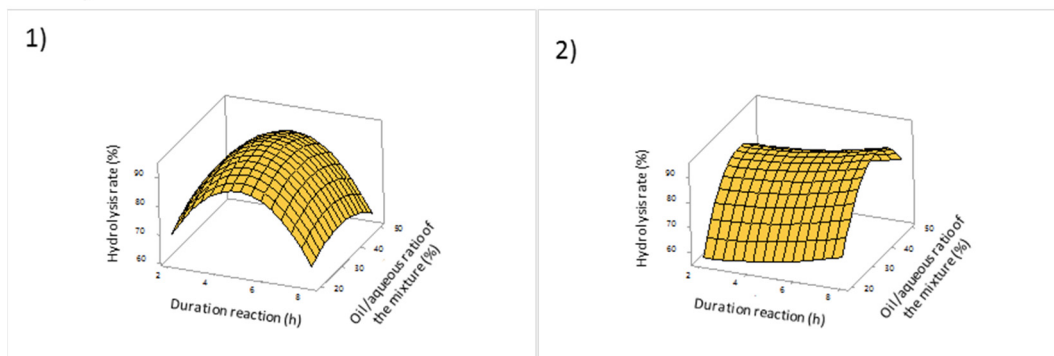
Sample number (Standard Order)	Randomized Order	Duration reaction (h)	Enzyme load (U)	Oil/aqueous ratio of the mixture (%)	Hydrolysis rate (%)
1	35	2	1900	20	51.5
2	31	2	800	35	98.4
3	42	5	3000	50	74.0
4	40	5	3000	20	52.4
5	43	5	1900	35	87.8
6	33	2	3000	35	86.0
7	39	5	800	20	64.8
8	37	2	1900	50	66.2
9	44	5	1900	35	88.3
10	32	8	800	35	97.0
11	36	8	1900	20	80.0
12	38	8	1900	50	83.7
13	45	5	1900	35	91.0
14	41	5	800	50	83.7
15	34	8	3000	35	73.6
16	19	8	3000	35	75.0
17	25	5	3000	20	49.2
18	22	2	1900	50	65.3
19	20	2	1900	20	52.0
20	23	8	1900	50	92.6
21	26	5	800	50	84.6
22	29	5	1900	35	88.3
23	27	5	3000	50	72.7
24	28	5	1900	35	87.4
25	21	8	1900	20	77.7
26	17	8	800	35	99.3
27	18	2	3000	35	91.8
28	24	5	800	20	65.3
29	30	5	1900	35	85.1
30	16	2	800	35	100.0
31	13	5	1900	35	86.4
32	2	8	800	35	94.3
33	7	2	1900	50	65.3
34	11	5	800	50	84.1
35	5	2	1900	20	51.5
36	6	8	1900	20	70.1

37	14	5	1900	35	85.5
38	1	2	800	35	100.0
39	15	5	1900	35	86.9
40	10	5	3000	20	47.8
41	8	8	1900	50	85.5
42	4	8	3000	35	75.9
43	9	5	800	20	68.5
44	12	5	3000	50	73.6
45	3	2	3000	35	83.2

I) $D \times E$



II) $D \times O$



III) $E \times O$

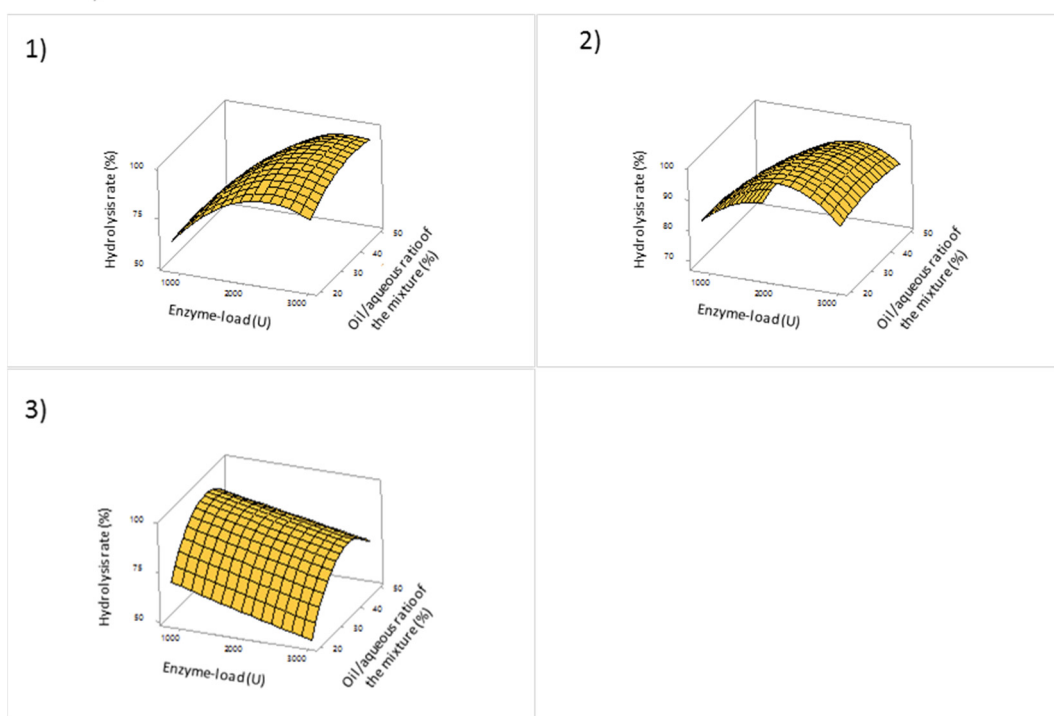


Figure S3. Three-dimensional (3D) response surface plots of the hydrolysis rate (%) with CRL, as function of : (I) the duration reaction (D) and enzyme-load (E) for linseed oil ; (II) the duration reaction (D) and oil/aqueous ratio of the mixture (O) for sunflower oil (1) and for linseed oil (2) ; (III) the enzyme-load (E) and oil/aqueous ratio of the mixture (O) for sunflower oil (1), hempseed oil (2) and linseed oil (3). The holding values are : 5 hours for the duration reaction, 1900U for the enzyme-load and 35% for the oil/aqueous ratio of the mixture.