Hydrothermal Liquefaction of Plastics: a survey of the effect of reaction conditions on the reaction efficiency.

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Supporting Information:

Table S1: Reaction conditions present in literature. nd: not determined. a: Pressures that were not explicitly given were estimated with the water vapor saturation curve. b: Solid residues almost pure TA.

Plastic	Temp, Press, Time, Heat rate	Water:Plastic, Fill rate, Volume	Criticality, Type, Purge, Stirred, Coating	Yield (%o/g/aq/s)	Size feedstock, amount feedstock	HHV
HDPE[11]	300 ºC, 8 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Sub, Batch, No, Yes, Steel	9%/68%o 0/0%g N/A-aq 91%/32%s	mm/powder, 17 g	nd
HDPE[11]	350 ºC, 16.5 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Sub, Batch, No, Yes, Steel	0%/86%o 0%/0%g N/A-aq 100%/14%s	mm/powder, 17 g	nd
HDPE[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/m	17:1, 42.5%, 20 mL	Sub, Batch, No, No, Teflon	0%o 0%g 8%aq 92%s	2 mm, 0.5 g	nd
HDPE[11]	400 ºC, 25 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Super, Batch, No, Yes,	0%/99%o 0%/1%g N/A-aq 100%/0%s	mm/powder, 17 g	nd

			Steel				
HDPE[7]	425 ºC, 23 MPa, 2.5 hr, 7 ºC/m	~2:1 14%, 500 mL	Super, Batch, N_2, Yes, Steel	87%o 13%g N/A-aq 0%s	N/A, 40 g	42.94 MJ/kg (diesel)
HDPE[6]	425 ºC, 42 MPa, 2 hr, 34 ºC/min	5:1, 30%, 42 mL	Super, Batch, No, Yes, Hastelloy	90.2%o 6.5%g N/A-aq 3.3%s	4-5 mm, 2.52 g	nd
HDPE[6]	425 ºC, 42 MPa, 3 hr, 34 ºC/min	5:1, 30%, 42 mL	Super, Batch, No, Yes, Hastelloy	77.7%o 13.2%g 0.8-aq 8.3%s	4-5 mm, 2.52 g	nd
HDPE[8]	450 ºC, 0.25 MPa, 1 hr, 7 ºC/min	0:1, N/A, 500 mL	Sub, Batch, N_2, Yes, Steel	84.5%o 14%g N/A-aq 1.5%s	N/A, 40 g	nd
HDPE[8]	450 ºC, 1.55 MPa, 1 hr, 7 ºC/min	1:19, 0.4%, 500 mL	Sub, Batch, N_2, Yes, Steel	89%o 10.5%g N/A-aq 0.5%s	N/A, 40 g	nd
HDPE[8]	450 ºC, 3.75 MPa, 1 hr, 7 ºC/min	1:7, 1.1%, 500 mL	Sub, Batch, N_2, Yes, Steel	89%o 10.5%g N/A-aq 0.5%s	N/A, 40 g	nd
HDPE[8]	450 ºC, 10.3 MPa, 1 hr, 7 ºC/min	3:7, 3.4%, 500 mL	Sub, Batch, N_2, Yes, Steel	89%o 10.5%g N/A-aq 0.5%s	N/A, 40 g	nd
HDPE[8]	450 ºC, 23 MPa, 1 hr, 7 ºC/min	~2:1, 14%, 500 mL	Sub, Batch, N_2, Yes, Steel	87%0 13%g N/A-aq 0%s	N/A, 40 g	nd
HDPE[9]	460 ºC, 25 MPa[a], 1 m, 10 ºC/min	6:1, 28.8%, 125 mL	Super, Batch, N_2, Yes, N/A	91.4%o 8.6%g N/A-aq 0%s	4 mm, N/A	nd
HDPE[12]	500 ºC, 25 MPa, 2 m, N/A	N/A, N/A, N/A	Super, Cont, No, Flow, N/A	15%o 2%g N/A-aq 83%s	Powder, N/A	nd
HDPE[12]	520 ºC, 25 MPa, 2 m,	N/A, N/A, N/A	Super, Cont, No,	20%o 5%g N/A-aq	Powder, N/A	nd

	N/A		Flow, N/A	75%s		
HDPE[12]	525 ºC, 25 MPa, 2 m, N/A	N/A, N/A, N/A	Super, Cont, No, Flow, N/A	65%o 7%g N/A-aq 28%s	Powder, N/A	nd
HDPE[12]	530 ºC, 25 MPa, 2 m, N/A	N/A, N/A, N/A	Super, Cont, No, Flow, N/A	79%o 9%g N/A-aq 12%s	Powder, N/A	nd
HDPE[12]	550 ºC, 25 MPa, 2 m, N/A	N/A, N/A, N/A	Super, Cont, No, Flow, N/A	75%o 20%g N/A-aq 5%s	Powder, N/A	nd
LDPE[15]	152 ºC, 1 MPa[a], 1 m, N/A	33:1, nd, 1 L	Sub, Batch, N_2, No, Steel	13.6%o nd-g N/A-aq nd-s	5 mm, 20 g	nd
LDPE[15]	300 ºC, 8 MPa[a], 2 hr, N/A	6:1, nd, 1 L	Sub, Batch, N_2, No, Steel	28%o nd-g N/A-aq nd-s	5 mm, 20 g	nd
LDPE[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	17:1, 42.5% 20 mL	Sub, Batch, No, No, Teflon	1%o 2%g 5%aq 92%s	2 mm, 0.5 g	nd
LDPE[13]	400 ºC, 25 MPa, 1 hr, N/A	6:1, 30%, 100 mL	Super, Batch, No, Yes, Steel	87%o 13%g N/A-aq 0%s	0.25 mm, 5 g	nd
LDPE[14]	425 ºC, 36 MPa, 1 hr, 11 ºC/min	5:1, nd, 75 mL	Super, Batch, N_2, Yes, Steel	88%o 3%g N/A-aq 9%s	N/A, N/A	nd
LDPE[14]	450 ºC, 42 MPa, 15 m, 11 ºC/min	5:1, nd, 75%	Super, Batch, N_2, Yes, Steel	96%o 1.3%g N/A-aq 2.7%s	N/A, N/A	nd
PC[20]	250 ºC, 5 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	82.1%o 0%g N/A-aq 17.9%s nd-BPA	N/A, 10 g	nd
PC[29]	300 ºC, 8 MPa[a],	8:1, 48%,	Sub, Batch,	nd-o nd-g	3 mm, 3 g	nd

	45 m, N/A	50 mL	No, Yes, Steel	N/A-aq nd-s 37% BPA		
PC[17]	300 ºC, 8 MPa, 1 hr, 135 ºC/min	8:1	Sub, Batch, No, No, Steel	64.9%o 25%g N/A-aq 20.1%s 46.8% BPA	2 mm, 0.12 g	nd
PC[20]	300 ºC, 8 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	91%o 0%g N/A-aq 9%s nd-BPA	N/A, 10 g	nd
PC[20]	350 ºC, 17 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	93%o 0%g N/A-aq 7%s 7.67% BPA	N/A, 10 g	nd
PC[16]	350 ºC, 17 MPa, 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	nd -o 6%g N/A-aq nd-s nd-BPA	N/A, 10 g	nd
PC[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	7:1, 42.5% 20 mL	Sub, Batch, No, No, Teflon	74%o 10%g N/A-aq 16%s 32.8% BPA	2 mm, 0.5 g	nd
PC[28a]	400 ºC, 25 MPa, 15 m, N/A	9:1, 41.7%, 12 mL	Super, Batch, N_2, Yes, Steel	99.8%o 0%g N/A-aq 0.2%s 15% BPA	3 mm, 0.5 g	nd
PC[17]	425 ºC, 25 MPa, 30 m, 135 ºC/min	8:1, 95%, 4 mL	Super, Batch, No, No, Steel	60%o 35%g N/A-aq 5%s 7.5% BPA	2 mm, 0.12 g	33 MJ/kg
HIPS[20]	250 ºC, 5 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	7%o 0%g N/A-aq 93%s	N/A, 10 g	nd
PS[11]	300 ºC, 8 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Sub, Batch, No, Yes, Steel	0%/91%o 0%/0%g N/A-aq 100%/9%s	mm/powder, 17 g	nd
HIPS[20]	300 ºC, 8 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	40%o 0%g N/A-aq 60%s	N/A, 10 g	nd
PS[17]	350 ºC,	18:1,	Sub,	86%o	2 mm,	43 MJ/kg

	16.5 MPa, 30 m, 135 ºC/min	95%, 4 mL	Batch, No, No, Steel	10%g N/A-aq 4%s	0.12 g	
PS[11]	350 ºC, 16.5 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Sub, Batch, No, Yes, Steel	 0%/95%o 0%/0%g N/A-aq 100%/5%s	mm/powder, 17 g	nd
HIPS[20]	350 ºC, 17 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	 90%o 1%g N/A-aq 9%s	N/A, 10 g	nd
HIPS[16]	350 ºC, 17 MPa, 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	 nd-o nd-g N/A-aq nd-s	N/A, 10 g	nd
PS[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	17:1, 42.5% 20 mL	Sub, Batch, No, No, Teflon	 3%o 5%g 20%aq 72%s	2 mm, 0.5 g	nd
PS[19]	370 ºC, 24 MPa, 5 m, 7 ºC/min	N/A, N/A, 1 L	Sub, Semi, Ar, Yes, Steel	 80% nd-g N/A-aq nd-s	2.8-3.3 mm, 30 g	nd
PS[19]	380 ºC, 24 MPa, 15 m, 7 ºC/min	N/A, N/A, 1 L	Super, Semi, Ar, Yes, Steel	 100%o 0%g N/A-aq 0%s	2.8-3.3 mm, 30 g	nd
PS[19]	390 ºC, 24 MPa, 3 m, 7 ºC/min	N/A, N/A, 1 L	Super, Semi, Ar, Yes, Steel	 100%o 0%g N/A-aq 0%s	2.8-3.3 mm, 30 g	nd
PS[17]	400 ºC, 25 MPa, 30 m, 135 ºC/min	13:1, 95%, 4 mL	Super, Batch, No, No, Steel	 58%o 39%g N/A-aq 3%s	2 mm, 0.12 g	45 MJ/kg
PS[11]	400 ºC, 25 MPa[a], 1 hr, N/A	nd, nd, 100 mL	Super, Batch, No, Yes, Steel	 98%/95%o 0%/0%g N/A-aq 2%/5%s	mm/powder, 17 g	nd
HIPS[21]	400 ºC, 30 MPa, 1 hr, N/A	nd, nd, 3 mL	Super, Batch, Ar, No, Quartz	 38.2%o nd-g N/A-aq nd-s	0.85 mm, N/A	nd

PS[17]	425 ºC, 25 MPa, 30 m, 135 ºC/min	8:1, 95%, 4 mL	Super, Batch, No, No, Steel	52%o 45%g N/A-aq 3%s	2 mm, 0.12 g	38 MJ/kg
PS[17]	450 ºC, 25 MPa, 30 m, 135 ºC/min	3:1, 95%, 4 mL	Super, Batch, No, No, Steel	45%o 55%g N/A-aq 0%s	2 mm, 0.12 g	37 MJ/kg
HIPS[21]	490 ºC, 30 MPa, 10 m, N/A	19:1, nd, 3 mL	Super, Batch, Ar, No, Quartz	77%o nd-g N/A-aq nd-s	0.85 mm, N/A	nd
PP[16]	350 ºC, 17 MPa[a], 1 hr, N/A	30:1, 30%, 1 L	Sub, Batch, N_2, Yes, Quartz	nd-o nd-g N/A-aq 64%s	N/A, 10 g	nd
PP[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	17:1, 42.5%, 20 mL	Sub, Batch, No, No, Teflon	7%o 5%g 4%aq 84%s	2 mm, 0.5 g	nd
PP[18]	380 ºC, 23 MPa, 4 hr, 39 ºC/min	5:1, nd, 35 mL	Super, Batch, N_2, Yes, Steel	18%o 0%g N/A-aq 82%s	N/A, 1 g	48 MJ/kg
PP[18]	400 ºC, 23 MPa, 4 hr, 39 ºC/min	9:1, nd, 35 mL	Super, Batch, N_2, Yes, Steel	55%o 1%g N/A-aq 44%s	N/A, 1 g	48 MJ/kg
PP[13]	400 ºC, 25 MPa, 1 hr, 39 ºC/min	6:1, 30%, 100 mL	Super, Batch, No, Yes, Steel	87%o 13%g N/A-aq 0%s	0.25 mm, 5 g	nd
PP[18]	425 ºC, 23 MPa, 2 hr, 39 ºC/min	8:1, nd, 35 mL	Super, Batch, N_2, Yes, Steel	92%o 8%g N/A-aq 0%s	N/A, 1 g	48 MJ/kg
PP[17]	425 ºC, 25 MPa, 30 m, 135 ºC/min	8:1, 95%, 4 mL	Super, Batch, No, No, Steel	34%o 66%g N/A-aq 0%s	2 mm, 0.12 g	44 MJ/Kg
PP[8]	450 ºC, 0.25 MPa, 1 hr, 7 ºC/min	0:1, N/A, 500 mL	Sub, Batch, N_2, Yes,	80.5%o 18%g N/A-aq 1.5%s	N/A, 40 g	nd

			Steel			
PP[8]	450 ºC, 1.55 MPa, 1 hr, 7 ºC/min	1:19, 0.4%, 500 mL	Sub, Batch, N_2, Yes, Steel	84.5%o 15%g N/A-aq 0.5%s	N/A, 40 g	nd
PP[8]	450 ºC, 3.75 MPa, 1 hr, 7 ºC/min	1:7, 1.1%, 500 mL	Sub, Batch, N_2, Yes, Steel	84.5% 15%g N/A-aq 0.5%s	N/A, 40 g	nd
PP[8]	450 ºC, 10.3 MPa, 1 hr, 7 ºC/min	3:7, 3.4%, 500 mL	Sub, Batch, N_2, Yes, Steel	83.5%o 16%g N/A-aq 0.5%s	N/A, 40 g	nd
PP[18]	450 ºC, 23 MPa, 30 min, 39 ºC/min	3:1, nd, 35 mL	Super, Batch, N_2, Yes, Steel	90%o 5%g N/A-aq 5%s	N/A, 1 g	48 MJ/kg
PP[8]	450 ºC, 23 MPa, 1 hr, 7 ºC/min	~2:1, 14%, 500 mL	Sub, Batch, N_2, Yes, Steel	82%o 18%g N/A-aq 0%s	N/A, 40 g	nd
PET[26]	240 ºC, 3.2 MPa, 30 m, 10 ºC/min	10:1, 60%, 50 mL	Sub, Batch, No, Yes, Steel	nd-o nd-g N/A-aq 90%s 90% TA[b]	N/A, 3.75 g	nd
PET[27]	300 ºC, 10 MPa, 1.5 hr, 4 ºC/min	30:1, 45%, 600 mL	Sub, Batch, N_2, Yes, Steel	nd-o nd-g N/A-aq 75%s 75% TA[b]	0.5 mm, 9 g	nd
PET[17]	350 ºC, 16.5 MPa, 30 m, 135 ºC/min	18:1, 95%, 4 mL	Sub, Batch, No, No, Steel	5%o 6%g 7%aq 82%s 82% TA[b]	2 mm, 0.12 g	32 MJ/Kg
PET[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	17:1, 42.5% 20 mL	Sub, Batch, No, No, Teflon	10%o 4%g 16%aq 70%s 70% TA[b]	2 mm, 0.5 g	nd
PET[28a]	400 ºC, 25 MPa, 15 m, N/A	10:1, 41.7%, 12 mL	Super, Batch, N_2, Yes, Steel	0%o 31.5%g N/A-aq 68.5%s 68.5% TA[b]	3 mm, 0.5 g	nd
PET[17]	400 ºC, 25 MPa, 30 m,	13:1, 95%, 4 mL	Super, Batch, No,	5%o 18%g 5%aq	2 mm, 0.12 g	31 MJ/Kg

	135 ºC/min		No, Steel	72%s 72% TA[b]		
PET[17]	425 ºC, 25 MPa, 30 m, 135 ºC/min	8:1, 95%, 4 mL	Super, Batch, No, No, Steel	14%o 8%g 4%aq 74%s 74% TA[b]	2 mm, 0.12 g	35 MJ/Kg
PET[17]	450 ºC, 25 MPa, 30 m, 135 ºC/min	3:1, 95%, 4 mL	Super, Batch, No, No, Steel	16%o 5%g 5%aq 74%s 74% TA[b]	2 mm, 0.12 g	34 MJ/Kg
PVC[22]	300 ºC, 8.9 MPa, 1 hr, N/A	66:1, 50%, 20 mL	Sub, Batch, Ar, No, Haynes	12%o nd-g N/A-aq 33%s	0.2 mm, 0.15 g	nd
PVC[10]	350 ºC, 19.5 MPa[a], 20 m, 82 ºC/min	17:1, 42.5% 20 mL	Sub, Batch, No, No, Teflon	10%o 6%g 40%aq 44%s	2 mm, 0.5 g	nd

Table S2: Data for Figure 3
PP HTL

Temperature	Oil yield (wt%)	Ref.
350	7	10
350	36	16
380	18	18
400	55	18
425	34	17
425	92	18
450	82	8
450	90	18

Table S3: Data for Figure 4
PS & HIPS

Temperature	Oil yield (wt%)	Ref.
250-HIPS	7	20
300-HIPS	40	20
300-PS	0	11
350-HIPS	90	20
350-PS	3	10
350-PS	86	17
350-PS	95	11
370-PS Semibatch	80	19
380-PS Semibatch	100	19
390-PS Semibatch	100	19
400-HIPS	38.2	21
400-PS	58	17
400-PS	98	11
425-PS	52	17

450-PS	45	17
490-HIPS	77	21

Table S4: Data for Figure 5
PET HTL TA

Temperature	Oil yield (wt%)	Ref.
240-TA ZnAc2	90	26
300-TA Main	75	27
350-PET Main	5	17
350-PET Two	10	10
350-TA Two	70	10
350-TA Main	82	17
400-PET Two	0	28a
400-PET Main	5	17
400-TA Two	68.5	28a
400-TA Main	72	17
425-PET Main	14	17
425-TA Main	74	17
450-PET Main	16	17
450-TA Main	74	17

Table S5: Data for Figure 6
PC HTL + BPA

Temperature	Oil yield (wt%)	Ref.
250-PC	82.1	20
300-BPA Main	37	29
300-BPA Outlier	46.8	17
300-PC Main	64.9	17
300-PC Outlier	91	20
350-BPA Outlier	7.67	20
350-BPA Main	32.8	10
350-PC Main	74	10
350-PC Outlier	93	20
400-BPA Main	15	28a
400-PC Main	99.8	28a
425-BPA Main	7.5	17
425-PC Main	60	17

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