1 Appendixes

1.1 The reactor temperatures profiles and energy consumption

The plot illustrates the chronological steps of the experiment process and the temperature profile in the reactor and stirring rotation speed.

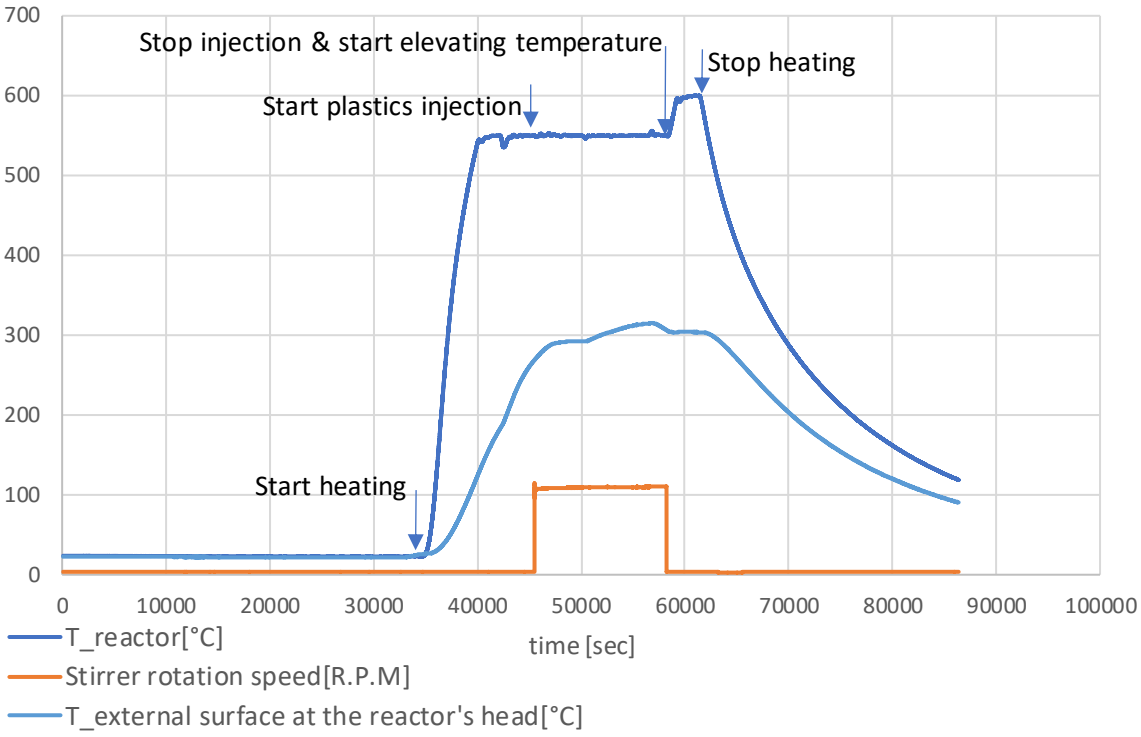

Figure S 1 The reactor temperatures profiles

For measuring the energy consumption in the reactor, a single-phase energy meter was used and the energy consumption was between 1.0 and 1.2 kWh/kg. A better insulation of the head of the reactor would decrease the energy consumption.

1.2 The design of experiments

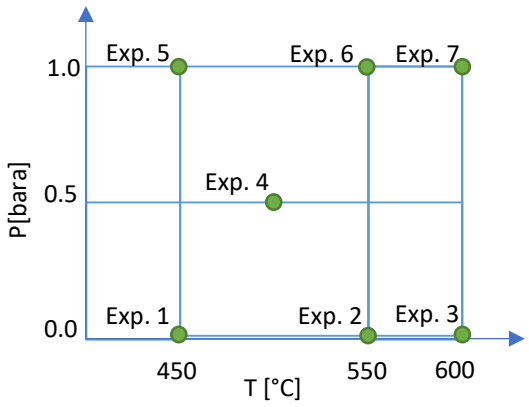

Figure S 2 Design of 7 experiments and their operating conditions

1.3 The residence time

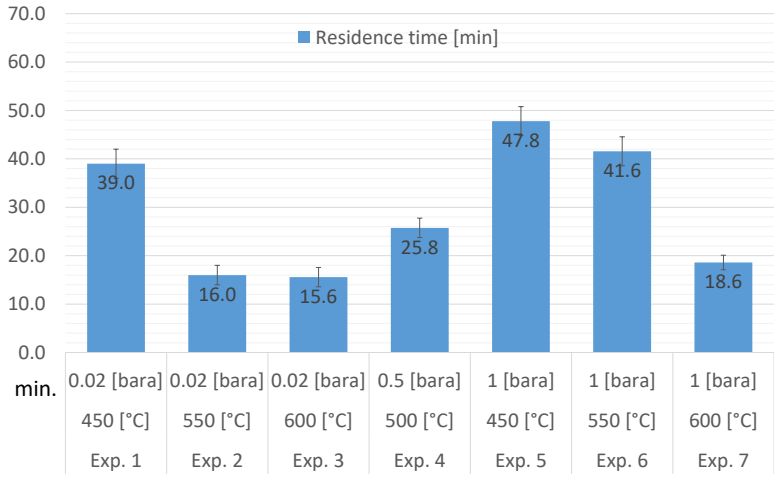

Figure S 3 The effect of the temperature (450, 550, and 600 °C) and pressure levels (0.02 and 1.0 bara) on the residence time (t_{res}.)

1.4 Yield (wt.%) of products from pyrolysis of end-of-life polystyrene

Table S 1 Yield (wt.%) of products from pyrolysis of end-of-life polystyrene (mono-aromatics (mon-A), di-aromatics (di-A), tri-aromatics tri-A), tetra-aromatics (tetra-A))

Experiment			**1**	**2**	**3**	**4**	**5**	**6**	**7**
P [bara]			**0.02**	**0.02**	**0.02**	**0.5**	**1.00**	**1.00**	**1.00**
T [°C]			**450**	**550**	**600**	**500**	**450**	**550**	**600**
Compound Name	**Group type**	**C#**	**wt.% to the input feedstock**						
gas (sum)	**C1-C4**		**1.68**	**2.30**	**2.32**	**0.68**	**0.75**	**1.45**	**3.18**
Liquid (sum)			**91.64**	**94.46**	**88.89**	**91.57**	**90.38**	**94.14**	**88.49**
benzene	mono-A	6	0.09	0.13	0.17	0.06	0.17	0.29	0.14
toluene	mono-A	7	2.16	3.16	2.49	4.04	4.93	6.10	8.14
ethylbenzene	mono-A	8	1.92	2.10	2.07	7.19	11.83	9.01	7.22
styrene	mono-A	8	45.10	55.87	54.53	41.65	35.69	41.17	43.22
xylene	mono-A	8	0.10	0.17	0.14	0.17	0.17	0.23	0.11
1,2,4 trimethyl-benzene	mono-A	9	0.19	0.13	0.14	0.54	0.78	0.68	0.31
alpha-methylstyrene	mono-A	9	3.15	3.41	3.44	5.51	6.14	6.01	4.42
Benzene, 1-ethenyl-2-methyl-	mono-A	9	0.13	0.27	0.32	0.30	0.22	0.33	0.56
Benzene, propyl-	mono-A	9	0.12	0.16	0.10	0.13	0.07	0.25	0.17
C9H12 mono-A	mono-A	9	0.01	0.15	0.10	0.20	0.07	0.35	0.46
C9H10 mono-A	mono-A	9	0.04	0.03	0.01	0.01	0.01	0.05	0.04
Benzene, (1-methylenepropyl)	mono-A	10	0.04	0.10	0.26	0.06	0.05	0.17	0.13
Benzene, 3-butenyl-	mono-A	10	0.02	0.08	0.09	0.05	0.02	0.07	0.04
C10H11 mono-A	mono-A	10	0.14	0.44	0.04	0.11	0.26	0.50	0.49
C10H12 mono-A	mono-A	10	0.03	0.23	0.04	0.24	0.20	0.44	0.21
C10H14 mono-A	mono-A	10	0.01	0.03	0.04	0.09	0.03	0.15	0.08

C11H14 mono-A	mono-A	11	0.17	0.25	0.21	0.16	0.14	0.40	0.41
1,1'-Biphenyl, 2-methyl-	di-A	13	0.01	0.02	0.02	0.02	0.04	0.06	0.08
1,1-diphenyl-1-propene	di-A	15	0.03	0.02	0.02	0.03	0.02	0.02	0.05
1,2-Diphenylpropane	di-A	15	0.05	0.47	0.75	0.31	0.27	0.41	0.18
1,3-Diphenylpropane	di-A	15	2.19	1.38	0.92	3.54	4.35	2.80	1.57
1,3-Diphenylpropene	di-A	15	0.36	0.51	0.50	0.92	0.86	0.71	0.53
2,3-Diphenylbutane	di-A	16	0.01	0.04	0.02	0.04	0.03	0.03	0.01
2,4-Diphenyl-1-butene (dimer)	di-A	16	3.84	3.31	3.69	2.43	1.29	1.01	0.42
2,4-Diphenyl-1-pentene (dimer)	di-A	17	0.52	0.39	0.37	0.46	0.38	0.11	0.04
2,5-Diphenyl-2-hexene	di-A	18	0.10	0.06	0.03	0.06	0.05	0.06	0.02
Bibenzyl	di-A	14	0.07	0.68	1.50	0.22	0.48	0.53	0.47
C10H8 di-A	di-A	10	0.10	0.69	0.25	0.64	0.21	1.02	0.57
C11H10 di-A	di-A	11	0.95	1.27	0.84	1.23	0.84	1.55	1.06
C11H12 di-A	di-A	11	0.01	0.07	0.06	0.07	0.05	0.18	0.25
C12H10 di-A	di-A	12	0.11	0.15	0.19	0.21	0.21	0.25	0.35
C12H16 di-A	di-A	12	0.03	0.37	0.16	0.19	0.06	0.05	0.57
C13H12 di-A	di-A	13	0.21	0.34	0.51	0.24	0.38	0.26	0.35
C14H12 di-A	di-A	14	0.18	0.11	0.22	0.16	0.12	0.28	0.67
C15H14 di-A	di-A	15	0.05	0.33	0.24	0.37	0.32	0.54	0.09
C16H12 di-A	di-A	16	0.21	0.48	0.32	0.22	0.41	0.80	1.17
C16H14 di-A	di-A	16	0.24	0.51	0.20	0.40	0.44	0.39	0.42
C16H16 di-A	di-A	16	0.30	1.37	1.31	1.14	0.72	0.64	1.42
C16H18 di-A	di-A	16	0.28	0.32	0.24	0.59	0.07	0.76	0.60
C17H16 di-A	di-A	17	0.20	0.03	0.01	0.05	0.08	0.02	0.42
C17H18 di-A	di-A	17	0.37	0.85	0.24	0.07	0.49	0.37	0.05
C18H18 di-A	di-A	18	0.05	0.11	0.47	0.68	0.51	0.72	0.18
C18H20 di-A	di-A	18	0.10	0.16	0.11	0.14	0.04	0.29	0.05
C9H10 di-A	di-A	9	0.01	0.04	0.09	0.10	0.01	0.06	0.14
cis-Stilbene	di-A	14	0.05	0.08	0.18	0.03	0.01	0.05	0.01
Diphenylmethane	di-A	13	0.17	0.05	0.08	0.05	0.06	0.12	0.21
Naphthalene	di-A	10	0.12	0.17	0.12	0.19	0.13	0.46	0.38
C17H14 tri-A	tri-A	17	1.13	0.23	0.04	0.25	0.31	0.23	0.24
C18H14 tri-A	tri-A	18	0.12	0.54	0.15	1.06	0.16	0.96	0.21
C18H16 tri-A	tri-A	18	1.62	0.61	0.26	0.61	0.87	0.71	0.37
C20H20 tri-A	tri-A	20	0.05	0.08	0.01	0.01	0.03	0.06	0.17
C22H20 tri-A	tri-A	22	0.05	0.14	0.01	0.01	0.01	0.05	0.06
C23H22 tri-A	tri-A	23	0.10	0.36	0.02	0.45	0.27	0.42	0.10
C24H24 tri-A	tri-A	24	1.58	1.32	0.25	1.75	0.94	1.33	0.36
C24H26 tri-A	tri-A	24	0.07	0.06	0.01	0.18	0.13	0.17	0.04
2,4,6-triphenyl-1-hexene (trimer)	tri-A	24	12.75	1.77	0.13	1.89	2.42	0.12	0.88
C25H26 tri-A	tri-A	25	0.66	1.16	0.12	1.45	0.93	0.66	0.17
1,2,4-Triphenylbenzene	tetra-A	19	0.13	0.17	0.13	0.47	0.79	0.54	0.33
C19H14 tetra-A	tetra-A	20	0.02	0.26	0.02	0.37	0.13	0.24	0.02
C23H18 tetra-A	tetra-A	21	0.02	0.38	0.02	0.74	0.27	0.06	0.14
C24H18 tetra-A	tetra-A	22	0.23	0.72	0.23	2.28	1.25	0.63	0.33

C24H20 tetra-A	tetra-A	23	0.10	0.19	0.10	0.15	0.21	0.27	0.09
aliphatic (sum)			4.03	4.15	7.08	3.46	6.37	5.32	5.82
others (penta-A, oxygenated, sulfur compounds, nitrogen compounds etc...)	others		4.65	1.24	2.46	1.10	1.61	1.61	0.71
char (by difference)			**6.68**	**3.24**	**8.78**	**7.74**	**8.87**	**4.41**	**8.33**

1.5 Extruder specifications

Table 2 The specifications of the single screw extruder

Screw diameter	25 mm
Screw L/D	30
Screw RPM	0 to 300
AC motor power	4 kW
Heating power	3.75 kW
Gear ratio	1:9.88
Minimum water pressure	3 to 4 bar
Water consumption	10 litres per minute at 2 bar
Max. processing temperature	400 °C (housing, screw, mould)

Figure S2 LabTech single screw extruder (1) (Model: LE25-30/CV, Thailand)