Supplementary Information

Subcritical Hydrothermal Liquefaction Co-cracking of Process Rejects of a Wastepaper-based Paper Mill with Waste Soybean Oil

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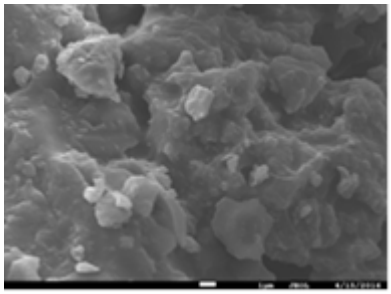
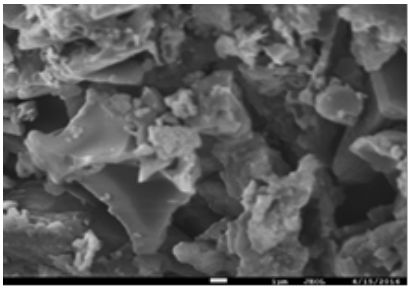
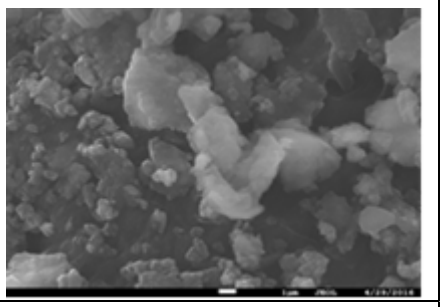
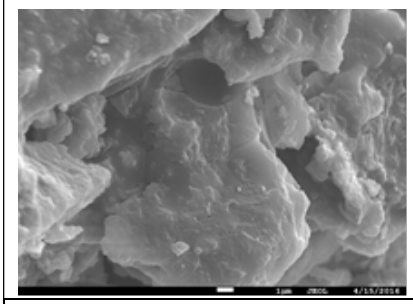
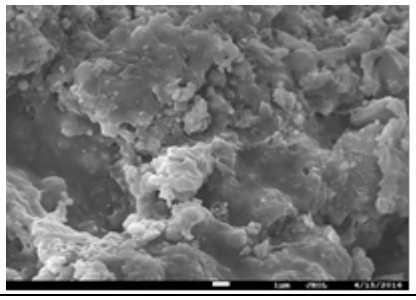
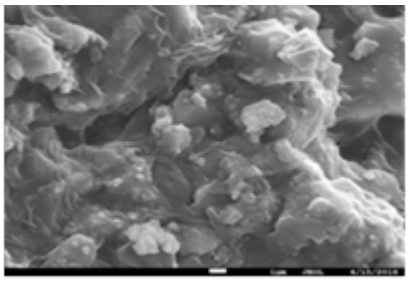
		
Figure S1(a)	Figure S1(b)	Figure S1(c)
		
Figure S1(d)	Figure S1(e)	Figure S1(f)

Figure S1 SEM photos of solid product at (a) 613 K and 0.5 hr without WSO (5000x); (b) 613 K and 1 hr without WSO (5000x); (c) 613 K and 2 hr without WSO (5000x); (d) 613 K and 4 hr without WSO (5000x); (e) 643 K and 2 hr without WSO (5000x); (f) 643 K and 4 hr without WSO (5000x).

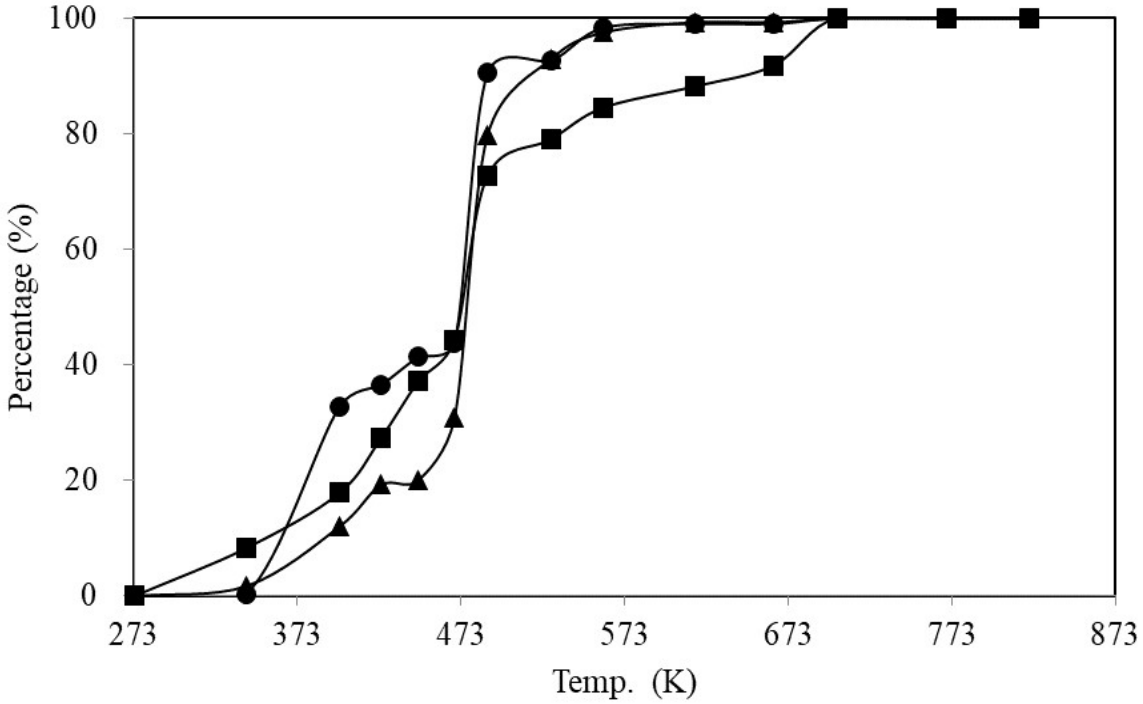


Figure S2 (a) Simulated distillation analysis of liquid-phase products at 2hr without WSO. ●:573 K, ■:613 K, ▲:643 K.

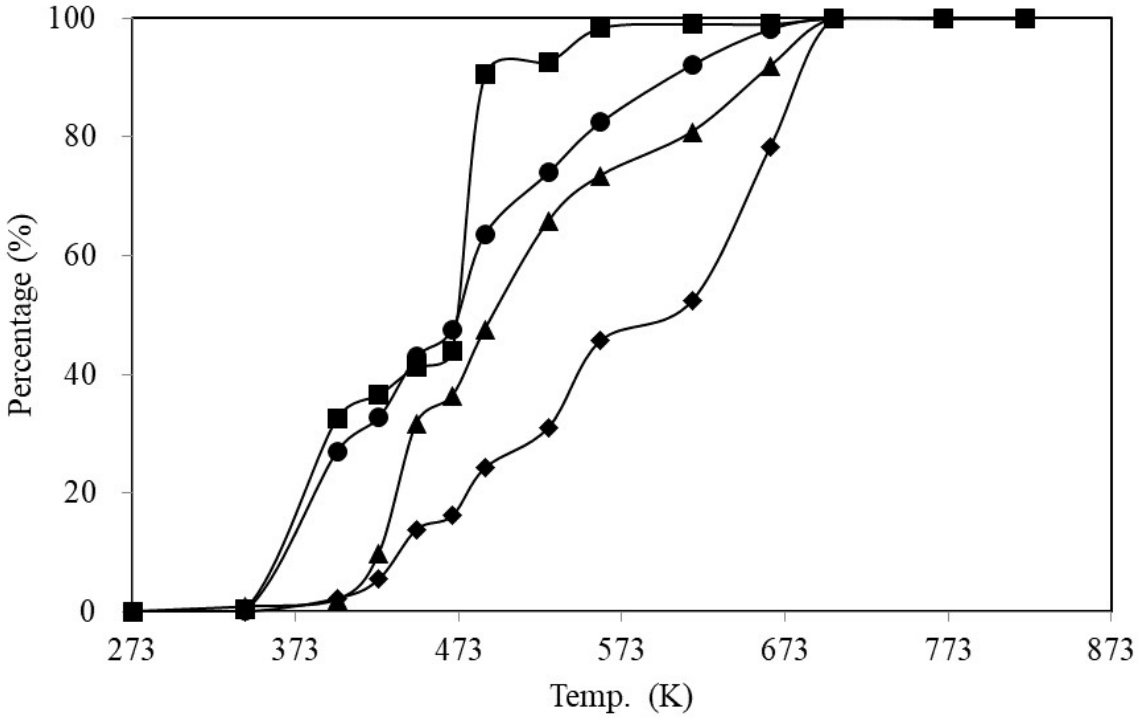


Figure S2 (b) Simulated distillation analysis of liquid-phase products at 573 K without WSO. ●:0.5 h, ◆:1 h, ■:2 h, ▲:4 h.

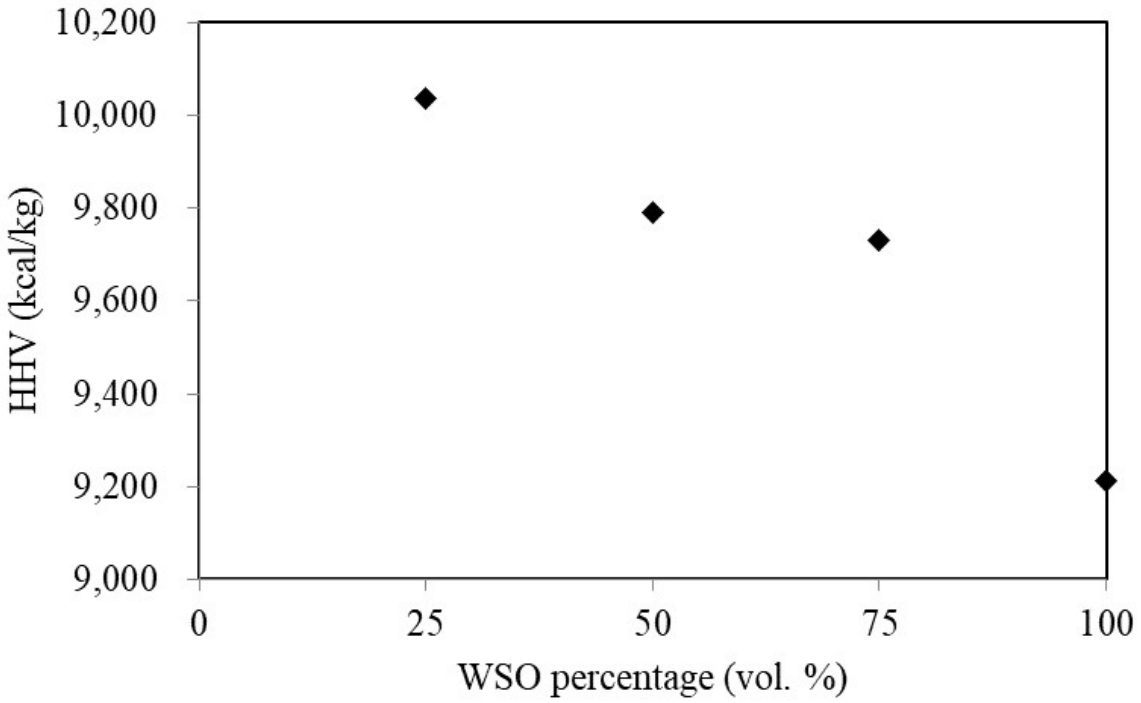


Figure S3 High heating value of oil-phase products of PRWPM using SHTL at different oil-water ratios in 573 K and 2 hr.

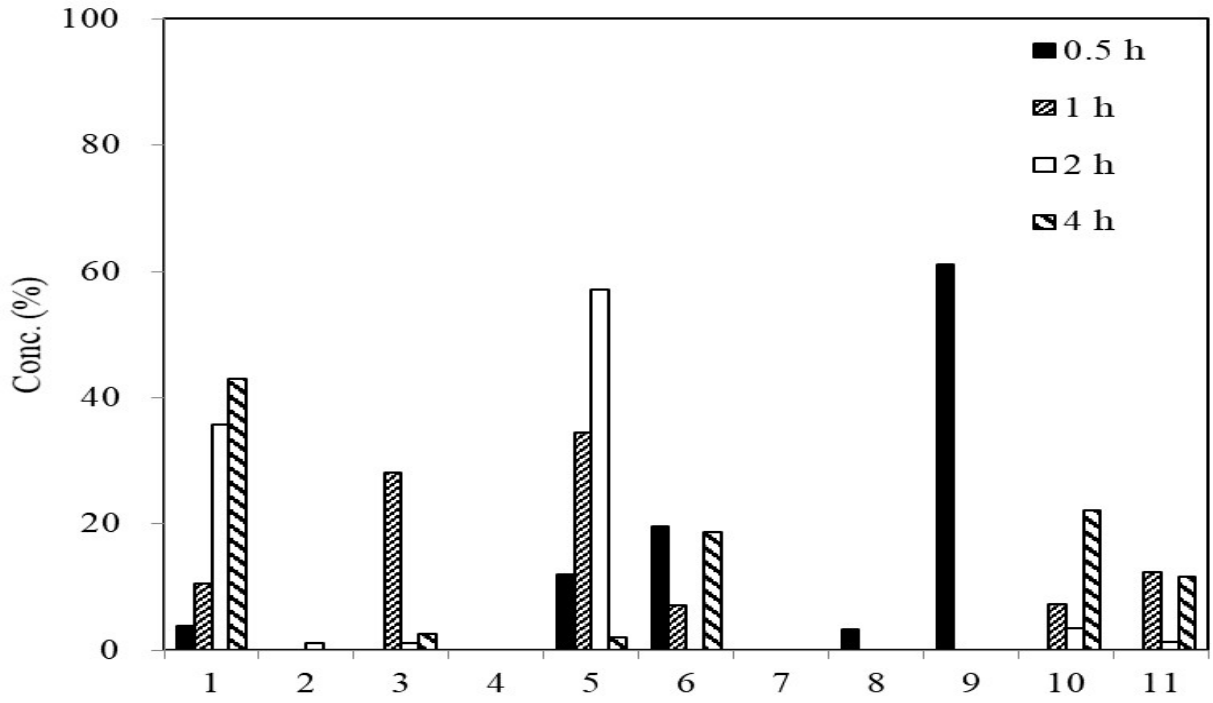


Figure S4 (a) GC/MS analysis of liquid-phase products at 573 K without WSO. 1. Alcohol, 2. Benzene, 3. Alkenyl, 4. Ketones, 5. Phenol, 6. Acid, 7. Alkali, 8. Ether, 9. Alkyl, 10. Furan, 11. Other.

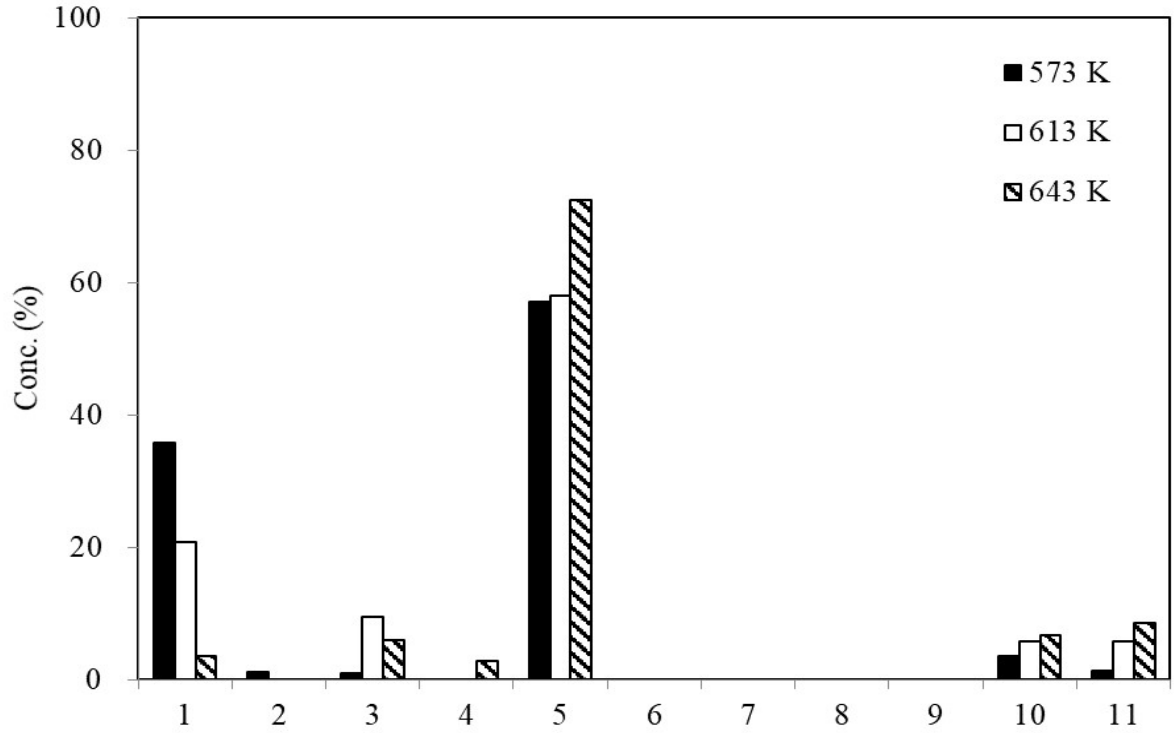


Figure S4 (b) GC/MS analysis of liquid-phase products at 2hr without WSO. 1. Alcohol, 2. Benzene, 3. Alkenyl, 4. Ketones, 5. Phenol, 6. Acid, 7. Alkali, 8. Ether, 9. Alkyl, 10. Furan, 11. Other.

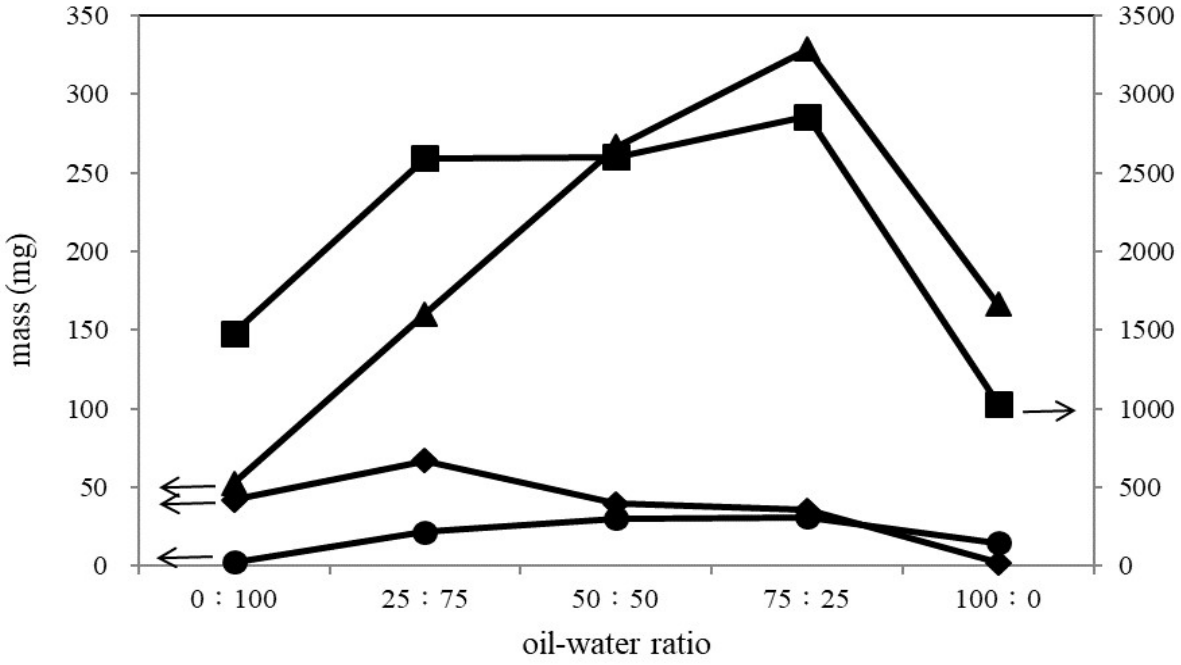


Figure S5 Mass of gas products of PRWPM using SHTL at different oil-water ratios in 573 K and 2 hr. ◆: H_2, ▲:CO, ●:CH_4, ■:CO_2.

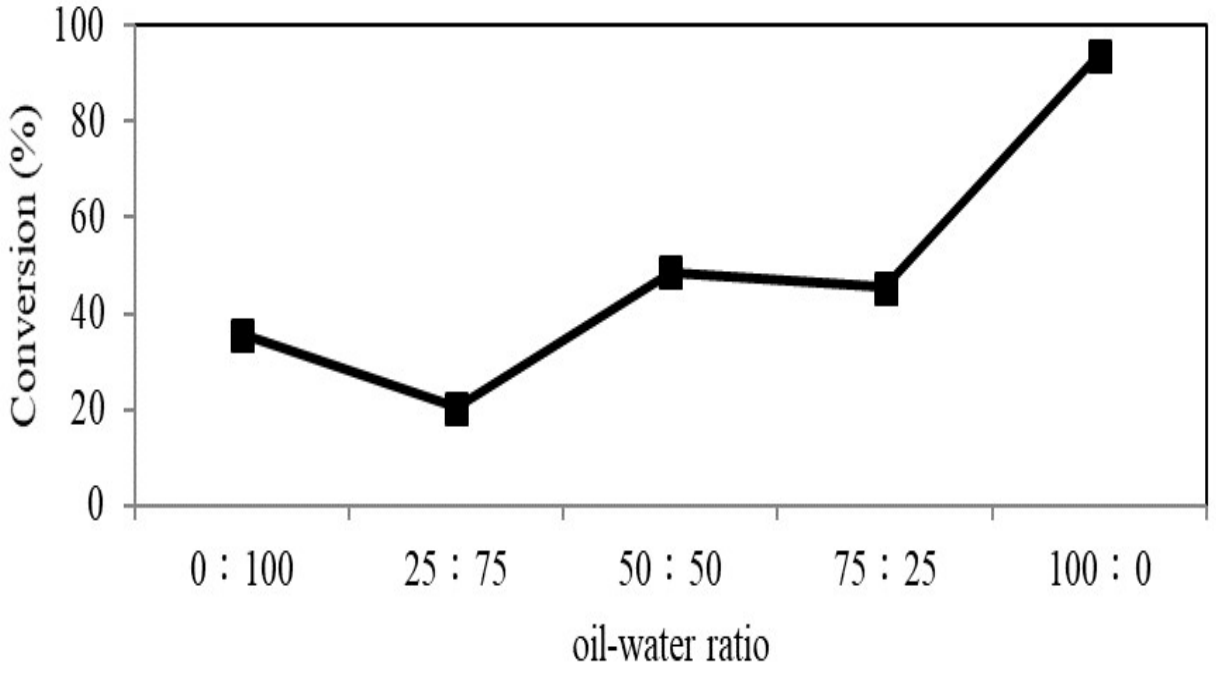


Figure S6 Conversion rate of PRWPM using SHTL at different oil-water ratios in 573 K and 2 hr.

Table S1 Characteristic analysis of raw PRWPM and solid-phase products from SHTL.

Sample	Temp. (K)	Time (Hour)	Oil-water ratio (oil: water)	kcal/kg (MJ/kg)	C	H	N	S	O	Volatile	Fixed carbon	Ash
Dry raw PRWPM	-	-	-	7,290 (30.52)	55.97	8.45	0.26	0.13	35.19	90.32	1.27	8.4
Solid-phase product	573	0.5	0：100	9,033 (37.82)	75.78	10.86	0.26	0.03	13.07	91.30	0.41	8.28
	613	0.5	0：100	8,871 (37.14)	75.55	11.71	0.38	0.11	12.25	86.54	0.87	12.59
	643	0.5	0：100	8,502 (35.60)	71.79	9.56	0.32	0.20	18.13	83.44	2.00	14.63
	573	1	0：100	9,601 (40.20)	81.48	12.29	0.18	0.07	5.98	90.85	0.69	8.46
	613	1	0：100	8,909 (37.30)	80.10	11.68	0.23	0.10	7.89	86.53	0.90	12.57
	643	1	0：100	8,819 (36.92)	77.99	11.51	0.26	0.12	10.12	83.14	1.21	15.65
	573	2	0：100	8,832 (36.98)	80.68	11.71	0.38	0.08	7.15	92.42	0.44	7.14
	613	2	0：100	8,545 (35.77)	78.57	11.15	0.47	0.08	9.73	89.00	0.77	10.23
	643	2	0：100	8,379 (35.08)	75.55	11.14	0.35	0.09	12.87	86.92	1.05	12.03
	573	4	0：100	9,091 (38.06)	75.62	11.18	0.25	0.11	12.84	89.25	0.76	9.99
	613	4	0：100	9,080 (38.01)	76.46	11.40	0.39	0.13	11.62	87.97	1.09	10.94
	643	4	0：100	8,286 (34.69)	69.94	8.64	0.35	0.14	20.93	84.39	1.20	14.41