

# Study of Comminution Kinetics in an Electrofragmentation Lab-Scale Device

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**Table S1.** Results obtained with monosize 5000/3350, negative polarity.

Sample code	2020071507	2020071506	2020071505	2020071504	2020071501	2020071502	2020071503
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	415.3	385.8	346.5	342.3	326.7	325	314.3
3350/2000	52.4	57.1	71	64.5	71.2	72.9	79.5
2000/1000	14.6	24.5	35.2	36.5	42.1	42.3	44.3
1000/500	6.4	12.6	18	21.4	21.6	21.6	22
500/125	5.4	11.3	17.4	21.5	22.9	21.7	23.4
125/0	2.8	4.8	7.7	8.8	9.3	9.4	10.6
<i>Total</i>	496.9	496.1	495.8	495	493.8	492.9	494.1
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	83.58%	77.77%	69.89%	69.15%	66.16%	65.94%	63.61%
3350/2000	10.55%	11.51%	14.32%	13.03%	14.42%	14.79%	16.09%
2000/1000	2.94%	4.94%	7.10%	7.37%	8.53%	8.58%	8.97%
1000/500	1.29%	2.54%	3.63%	4.32%	4.37%	4.38%	4.45%
500/125	1.09%	2.28%	3.51%	4.34%	4.64%	4.40%	4.74%

125/0	0.56%	0.97%	1.55%	1.78%	1.88%	1.91%	2.15%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	83.58%	77.77%	69.89%	69.15%	66.16%	65.94%	63.61%
2000	94.12%	89.28%	84.21%	82.18%	80.58%	80.73%	79.70%
1000	97.06%	94.21%	91.31%	89.56%	89.10%	89.31%	88.67%
500	98.35%	96.75%	94.94%	93.88%	93.48%	93.69%	93.12%
125	99.44%	99.03%	98.45%	98.22%	98.12%	98.09%	97.85%

**Table S2.** Results obtained with monosize 5000/3350, positive polarity.

[illegible]

Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	84.67%	80.89%	73.03%	72.00%	65.89%	61.95%	64.68%
2000	94.44%	90.35%	86.40%	85.09%	81.03%	79.42%	79.74%
1000	97.27%	94.90%	92.67%	91.89%	89.61%	88.20%	88.42%
500	98.43%	97.05%	95.75%	95.30%	93.95%	92.88%	93.04%
125	99.46%	99.06%	98.71%	98.56%	98.21%	97.81%	97.92%

**Table S3.** Results obtained with monosize 3350/2000, negative polarity.

[illegible]

2000	88.25%	81.25%	75.36%	73.32%	64.45%	63.54%	65.39%
1000	95.72%	92.02%	89.91%	88.53%	84.47%	84.07%	84.30%
500	97.81%	95.49%	94.28%	93.40%	90.95%	90.82%	90.80%
125	99.40%	98.32%	97.91%	97.49%	96.55%	96.54%	96.23%

**Table S4.** Results obtained with monosize 3350/2000, positive polarity.

Sample code	2020072108	2020072107	2020072106	2020072104	2020072101	2020072102	2020072103
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	436.2	396.1	370.3	346.7	315.5	327.4	328.2
2000/1000	38.5	59.8	75.4	84	101.7	94.3	93.1
1000/500	11.1	19	23.3	28.1	33.7	32.5	33.1
500/125	8.5	15	18.8	23.9	29	27.5	27.7
125/0	5.4	8.7	11.3	15.5	17.9	17.8	17.7
<i>Total</i>	499.7	498.6	499.1	498.2	497.8	499.5	499.8
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	87.29%	79.44%	74.19%	69.59%	63.38%	65.55%	65.67%
2000/1000	7.70%	11.99%	15.11%	16.86%	20.43%	18.88%	18.63%
1000/500	2.22%	3.81%	4.67%	5.64%	6.77%	6.51%	6.62%
500/125	1.70%	3.01%	3.77%	4.80%	5.83%	5.51%	5.54%
125/0	1.08%	1.74%	2.26%	3.11%	3.60%	3.56%	3.54%
<i>Total</i>	100%	100%	100%	100%	100%	100%	100%
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	87.29%	79.44%	74.19%	69.59%	63.38%	65.55%	65.67%
1000	95.00%	91.44%	89.30%	86.45%	83.81%	84.42%	84.29%

500	97.22%	95.25%	93.97%	92.09%	90.58%	90.93%	90.92%
125	98.92%	98.26%	97.74%	96.89%	96.40%	96.44%	96.46%

**Table S5.** Results obtained with monosize 2000/1000, negative polarity.

Sample code	2020072707	2020072706	2020072705	2020072704	2020072701	2020072702	2020072703
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	453	446.7	436.3	414.8	412.2	397.8	409.8
1000/500	34.7	39.4	43.1	55.8	57.8	66.2	59.4
500/125	7.2	8.1	11.1	17.9	17.4	22	18.3
125/0	5.8	7.4	9.5	12.6	12.1	14.9	13.7
<i>Total</i>	<i>500.7</i>	<i>501.6</i>	<i>500</i>	<i>501.1</i>	<i>499.5</i>	<i>500.9</i>	<i>501.2</i>
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	90.47%	89.06%	87.26%	82.78%	82.52%	79.42%	81.76%
1000/500	6.93%	7.85%	8.62%	11.14%	11.57%	13.22%	11.85%
500/125	1.44%	1.61%	2.22%	3.57%	3.48%	4.39%	3.65%
125/0	1.16%	1.48%	1.90%	2.51%	2.42%	2.97%	2.73%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	90.47%	89.06%	87.26%	82.78%	82.52%	79.42%	81.76%
500	97.40%	96.91%	95.88%	93.91%	94.09%	92.63%	93.62%
125	98.84%	98.52%	98.10%	97.49%	97.58%	97.03%	97.27%

**Table S6.** Results obtained with monosize 2000/1000, positive polarity.

Sample code	2020072307	2020072306	2020072305	2020072304	2020072301	2020072302	2020072303
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	458.7	444.4	426.2	423	405.2	404.4	409.1
1000/500	31.9	40.7	50.5	54	62.7	62.7	61.3
500/125	5.1	8.8	14.3	13.6	17.4	17.9	17.1
125/0	5.3	7.3	9.7	11	10.9	13.2	12.4
<i>Total</i>	<i>501</i>	<i>501.2</i>	<i>500.7</i>	<i>501.6</i>	<i>496.2</i>	<i>498.2</i>	<i>499.9</i>
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	91.56%	88.67%	85.12%	84.33%	81.66%	81.17%	81.84%
1000/500	6.37%	8.12%	10.09%	10.77%	12.64%	12.59%	12.26%
500/125	1.02%	1.76%	2.86%	2.71%	3.51%	3.59%	3.42%
125/0	1.06%	1.46%	1.94%	2.19%	2.20%	2.65%	2.48%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	91.56%	88.67%	85.12%	84.33%	81.66%	81.17%	81.84%
500	97.92%	96.79%	95.21%	95.10%	94.30%	93.76%	94.10%
125	98.94%	98.54%	98.06%	97.81%	97.80%	97.35%	97.52%

**Table S7.** Results obtained with monosize 1000/500, negative polarity.

Sample code	2020072807	2020072806	2020072805	2020072804	2020072801	2020072802	2020072803
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000/500	458	445.2	436.7	430.1	426.5	421.1	423.4
500/125	34.9	44.8	50.5	55.5	55.8	60.8	58.6
125/0	7.3	9.7	12.3	13.9	14.7	16.5	15.2
<i>Total</i>	<i>500.2</i>	<i>499.7</i>	<i>499.5</i>	<i>499.5</i>	<i>497</i>	<i>498.4</i>	<i>497.2</i>
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000/500	91.56%	89.09%	87.43%	86.11%	85.81%	84.49%	85.16%
500/125	6.98%	8.97%	10.11%	11.11%	11.23%	12.20%	11.79%
125/0	1.46%	1.94%	2.46%	2.78%	2.96%	3.31%	3.06%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500	91.56%	89.09%	87.43%	86.11%	85.81%	84.49%	85.16%
125	98.54%	98.06%	97.54%	97.22%	97.04%	96.69%	96.94%

**Table S8.** Results obtained with monosize 1000/500, positive polarity.

Sample code	2020073007	2020073006	202073005	2020073004	2020073001	2020073002	2020073003
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000/500	446.9	444	435.9	435.8	421.5	430.9	425.6
500/125	44.4	45.5	51.2	51.3	61.3	55.5	58.3
125/0	8.4	10.7	12.6	12.2	15.1	14	15.1
<i>Total</i>	<i>499.7</i>	<i>500.2</i>	<i>499.7</i>	<i>499.3</i>	<i>497.9</i>	<i>500.4</i>	<i>499</i>
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000/500	89.43%	88.76%	87.23%	87.28%	84.66%	86.11%	85.29%
500/125	8.89%	9.10%	10.25%	10.27%	12.31%	11.09%	11.68%
125/0	1.68%	2.14%	2.52%	2.44%	3.03%	2.80%	3.03%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500	89.43%	88.76%	87.23%	87.28%	84.66%	86.11%	85.29%
125	98.32%	97.86%	97.48%	97.56%	96.97%	97.20%	96.97%



**Table S9.** Results obtained with monosize 500/125, negative polarity.

Sample code	2020080307	2020080306	2020080305	2020080304	2020080301	2020080302	2020080303
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000/500	0.0	0.0	0.0	0.0	0.0	0.0	0.0
500/125	394.2	384.8	410.3	392.2	342.3	384.3	387.5
125/0	104.8	113.1	88.5	104.7	149.5	113	110.3
<i>Total</i>	499	497.9	498.8	496.9	491.8	497.3	497.8
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000/500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500/125	79.00%	77.28%	82.26%	78.93%	69.60%	77.28%	77.84%
125/0	21.00%	22.72%	17.74%	21.07%	30.40%	22.72%	22.16%
<i>Total</i>	100%	100%	100%	100%	100%	100%	100%
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
125	79.00%	77.28%	82.26%	78.93%	69.60%	77.28%	77.84%

**Table S10.** Results obtained with monosize 500/125, positive polarity.

Sample code	2020073101	2020073107	2020073106	2020073105	2020073102	2020073103	2020073104
Number of pulses	1	2	3	4	5	5	5
Monosize	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)
5000/3350	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3350/2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000/1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000/500	0.0	0.0	0.0	0.0	0.0	0.0	0.0
500/125	392.6	384	400.9	389.2	386.5	400.8	379.4
125/0	105.9	112.4	88.8	107.3	110.3	95.1	115.2
<i>Total</i>	<i>498.5</i>	<i>496.4</i>	<i>489.7</i>	<i>496.5</i>	<i>496.8</i>	<i>495.9</i>	<i>494.6</i>
Monosize	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)	Weight (%)
5000/3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3350/2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000/1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000/500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500/125	78.76%	77.36%	81.87%	78.39%	77.80%	80.82%	76.71%
125/0	21.24%	22.64%	18.13%	21.61%	22.20%	19.18%	23.29%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
Size	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)	Cum. oversize (%)
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
125	78.76%	77.36%	81.87%	78.39%	77.80%	80.82%	76.71%

**Table S11.** PSD values (modeled and real), feed 3350/2000 monosize.

Size ( $\mu\text{m}$ )	Negative polarity			Positive polarity		
	Model	Replica 2	Replica 3	Model	Replica 2	Replica 3
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	66.94%	63.54%	65.39%	64.51%	65.55%	65.67%
1000	81.53%	84.07%	84.30%	79.57%	84.42%	84.29%
500	89.11%	90.82%	90.80%	87.63%	90.93%	90.92%
125	96.32%	96.54%	96.23%	95.45%	96.44%	96.46%

**Table S12.** PSD values (modeled and real), feed 2000/1000 monosize.

Size ( $\mu\text{m}$ )	Negative polarity			Positive polarity		
	Model	Replica 2	Replica 3	Model	Replica 2	Replica 3
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	84.83%	79.42%	81.76%	85.85%	81.17%	81.84%
500	93.46%	92.63%	93.62%	93.96%	93.76%	94.10%
125	97.17%	97.03%	97.27%	97.27%	97.35%	97.52%

**Table S13.** PSD values (modeled and real), feed 1000/500 monosize.

Size ( $\mu\text{m}$ )	Negative polarity			Positive polarity		
	Model	Replica 2	Replica 3	Model	Replica 2	Replica 3
3350	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500	87.13%	84.49%	85.16%	85.09%	86.11%	85.29%
125	95.82%	96.69%	96.94%	95.77%	97.20%	96.97%