

Electronic Supporting Information

Scale-up of organic reactions in ball mills: Process intensification with regard to energy efficiency and economy of scale

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The following table summarizes the experimental conditions for the individual milling experiments and provides an overview regarding the correlation between different variables. The correlation to is given by different equations which are provided in the manuscript text.

Table S1 Correlation between different variables which are important to describe and understand some milling ball and substrate-related parameters. ^{a,b)}

Type of ball mill / $V_{B,total}$ / $n_{substrate,l}$	milling ball (MB) parameters			filling degrees MB		filling degrees for substrate		total filling degree
	d_{MB} [mm]	n_{MB} [-]	$m_{MB,total}$ [g]	$\Phi_{MB,material}$ [-]	$\Phi_{MB,packing}$ [-]	$\Phi_{GS,packing}$ [-]	Φ_{GS} [-]	Φ_{total} [-]
P7 / 45 ml / 20 mmol	2	ca. 2800	73	0.26	0.45	0.33	1.90	0.59
	5	180	73	0.26	0.45	0.33	1.90	0.59
	10	18	54	0.21	0.35	0.33	2.27	0.54
		26	78	0.30	0.50	0.33	1.59	0.63
P6 / 250 ml / 100 mmol	10	50	150	0.10	0.18	0.3	3.97	0.40
		79	238	0.17	0.28	0.3	2.56	0.47
		123	370	0.26	0.43	0.3	1.67	0.56
		148	445	0.31	0.52	0.3	1.38	0.61
		197	593	0.41	0.70	0.3	1.02	0.71

P6 / 500 ml / 200 mmol	20	10	237	0.17	0.30	0.3	2.13	0.47
		15	355	0.25	0.45	0.3	1.42	0.55
		16	380	0.27	0.48	0.3	1.33	0.57
		19	450	0.32	0.57	0.3	1.12	0.62
		25	592	0.42	0.76	0.3	0.84	0.72
	30	3	223	0.17	0.30	0.3	2.00	0.47
		4	297	0.23	0.40	0.3	1.50	0.53
		5	371	0.28	0.50	0.3	1.20	0.58
		6	446	0.34	0.60	0.3	1.00	0.64
		8	585	0.45	0.80	0.3	0.75	0.75
	10	171	513	0.18	0.30	0.3	2.38	0.48
		287	856	0.30	0.50	0.3	1.43	0.60
		398	1,197	0.42	0.70	0.3	1.02	0.72
	20	20	469	0.17	0.30	0.3	2.13	0.47
		33	774	0.28	0.50	0.3	1.28	0.58
		46	1,073	0.39	0.70	0.3	0.91	0.69
	30	6	443	0.17	0.30	0.3	2.00	0.47
		10	740	0.28	0.50	0.3	1.20	0.58
		14	1,040	0.40	0.70	0.3	0.86	0.70

^{a)} Filling degrees, Φ_i [-], were calculated according to the equations given in parentheses: $\Phi_{\text{MB,material}}$ (Eq. 5), $\Phi_{\text{MB,packing}}$ (Eq. 1), $\Phi_{\text{GS,packing}}$ (Eq. 6), Φ_{GS} (Eq. 8), and Φ_{total} (Eq. 7). The numbers refer to the numbering used in the manuscript.

^{b)} Values highlighted in grey relate to those which are in accordance to the manufacture's advice. Values highlighted in yellow relate to the conditions used for experiments summarized in Figure 2.