processes

MDPI

Supplementary data

Table S1. Measured outflow (Q) and the calculated average outflow (Q_{av}).

P_I (Psi)	P_I (×10⁴ Pa)	P_B (×10⁴ Pa)	ΔP (×10⁴ Pa)	Q (cm³/min)				Q_{av} (cm³/min)			
Compressed powder tablet at 60 MPa											
5	3.45	9.88	3.10	55.96	57.58	62.77	57.91	46.95	48.31	52.66	48.59
10	6.89	9.88	6.46	134.38	135.57	135.48	135.02	98.02	98.88	98.81	98.48
15	10.3	9.88	9.91	222.44	227.94	230.04	223.18	143.93	147.49	148.85	144.41
Compressed powder tablet at 80 MPa											
5	3.45	9.88	3.10	9.21	8.96	9.14	9.10	7.73	7.52	7.67	7.64
10	6.89	9.88	6.46	18.90	19.02	19.02	18.83	13.79	13.87	13.87	13.73
15	10.30	9.88	9.91	31.04	30.88	31.12	30.96	20.09	19.98	20.14	20.03
20	13.80	9.88	13.20	45.43	44.99	44.52	44.85	26.33	26.07	25.80	25.99
25	17.20	9.88	16.70	59.46	61.48	59.35	57.97	31.29	32.35	31.23	30.51
30	20.71	9.88	20.10	75.61	76.09	75.51	77.77	36.42	36.65	36.38	37.46
35	24.10	9.88	23.5	92.12	94.60	93.86	89.64	40.87	41.97	41.64	39.77
Compressed powder tablet at 100 MPa											
5	3.45	9.88	3.10	6.49	6.76	7.08	6.53	5.44	5.67	5.94	5.48
10	6.89	9.88	6.46	20.92	22.14	21.77	21.93	15.26	16.15	15.88	15.99
15	10.30	9.88	9.91	33.75	33.42	34.28	33.60	21.84	21.62	22.18	21.74
20	13.80	9.88	13.20	46.85	46.74	46.03	46.60	27.15	27.09	26.67	27.00
25	17.20	9.88	16.70	63.50	63.16	63.43	63.43	33.42	33.24	33.38	33.38
30	20.71	9.88	20.10	78.07	77.77	77.67	81.14	37.61	37.46	37.41	39.09
35	24.10	9.88	23.5	98.49	98.16	97.37	96.89	43.70	43.56	43.20	42.99
Compressed powder tablet at 120											
5	3.45	9.88	3.10	2.47	2.49	2.48	2.46	2.07	2.09	2.08	2.07
10	6.89	9.88	6.46	5.84	5.86	5.72	5.90	4.26	4.27	4.17	4.31
15	10.30	9.88	9.91	9.25	9.70	9.36	9.64	5.99	6.28	6.05	6.24
20	13.80	9.88	13.20	13.28	13.61	13.40	13.80	7.69	7,89	7.76	7.99
25	17.20	9.88	16.70	17.31	17.77	17.66	18.31	9.11	9.35	9.30	9.64
30	20.71	9.88	20.10	22.51	22.60	22.85	22.77	10.84	10.89	11.01	10.97
35	24.10	9.88	23.5	28.79	28.97	29.05	29.53	12.77	12.85	12.89	13.10
Compressed powder tablet at 140 MPa											
5	3.45	9.88	3.10	1.08	1.22	1.17	1.12	0.90	1.02	0.98	0.94
10	6.89	9.88	6.46	3.98	3.97	4.20	4.24	2.90	2.90	3.06	3.10
15	10.30	9.88	9.91	6.84	7.37	7.35	7.08	4.43	4.77	4.75	4.58
20	13.80	9.88	13.20	9.75	10.05	10.29	10.01	5.65	5.82	5.96	5.80
25	17.20	9.88	16.70	12.12	13.46	13.70	13.77	6.38	7.08	7.21	7.24
30	20.71	9.88	20.10	15.08	18.31	15.76	17.41	7.27	8.82	7.59	8.39
35	24.10	9.88	23.5	26.53	26.94	25.98	26.44	11.77	11.95	11.53	11.73
Compressed powder tablet at 160 MPa											
5	3.45	9.88	3.10	1.19	1.24	1.19	1.17	1.00	1.04	1.00	0.98
10	6.89	9.88	6.46	2.67	2.72	2.68	2.78	1.95	1,98	1.95	2.03
15	10.30	9.88	9.91	4.36	4.28	4.39	4.35	2.82	2.77	2.84	2.82
20	13.80	9.88	13.20	6.17	6.12	6.14	6.11	3.58	3.55	3.56	3.54
25	17.20	9.88	16.70	8.14	8.12	8.07	8.05	4.28	4.28	4.25	4.24
30	20.71	9.88	20.10	10.27	10.49	10.24	11.01	495	5.05	4.93	5.30
35	24.10	9.88	23.5	12.63	12.61	12.61	12.93	5.61	5.59	5.59	5.74

Compressed powder tablet at 180 MPa											
5	3.45	9.88	3.10	1.19	1.18	1.18	1.19	1.00	0.99	0.99	1.00
10	6.89	9.88	6.46	2.43	2.43	2.44	2.44	1.77	1.77	1.78	1.78
15	10.30	9.88	9.91	4.24	4.18	4.20	4.51	2.74	2.70	2.72	2.92
20	13.80	9.88	13.20	5.92	5.91	5.89	5.91	3.43	3.43	3.42	3.42
25	17.20	9.88	16.70	8.27	9.37	9.50	9.37	4.35	4.93	5.00	4.93
30	20.71	9.88	20.10	11.77	11.79	11.82	11.78	5.67	5.68	5.69	5.68
35	24.10	9.88	23.5	14.96	14.87	14.69	14.62	6.64	6.60	6.52	6.49
Compressed powder tablet at 200 MPa											
5	3.45	9.88	3.10	0.88	0.89	0.91	0.88	0.74	0.75	0.76	0.74
10	6.89	9.88	6.46	2.56	2.54	2.55	2.55	1.87	1.85	1.86	1.86
15	10.30	9.88	9.91	4.16	4.16	4.19	4.16	2.69	2.69	2.71	2.69
20	13.80	9.88	13.20	6.30	6.30	6.24	6.17	3.65	3.65	3.61	3.58
25	17.20	9.88	16.70	8.20	8.32	8.43	8.32	4.32	4.38	4.44	4.38
30	20.71	9.88	20.10	10.51	10.69	10.69	10.69	5.06	5.15	5.15	5.15
35	24.10	9.88	23.50	13.61	13.93	13.61	13.61	6.04	6.18	6.04	6.04

PI: inlet pressure, PB: barometric pressure

Table S2. Calculated Darcy permeability for each compressed powder tablet relative density.

Q_{avmoy} ($\times 10^{-7}$ m³/s)	L ($\times 10^{-3}$ m)	R ($\times 10^{-2}$ m)	A ($\times 10^{-4}$ m²)	μ ($\times 10^{-5}$ Pa·s)	ΔP ($\times 10^{4}$ Pa)	K_p ($\times 10^{-3}$ Darcy)	K_p ($\times 10^{-15}$ m²)
Compressed powder tablet at 60 MPa							
8.20 (0.31)					3.10	10.10 (0.04)	10.11 (0.04)
16.5 (0.04)	9.31 (0.40)	1.25 (0.04)	4.91 (0.42)	1.99	6.46	9.74 (0.03)	9.74 (0.03)
24.4 (0.03)					9.91	9.42 (0.11)	9.42 (0.11)
Compressed powder tablet at 80 MPa							
1.28 (0.01)					3.10	1.51 (0.02)	1.51 (0.02)
2.31 (0.01)					6.46	1.32 (0.01)	1.32 (0.01)
3.35 (0.01)					9.91	1.25 (0.01)	1.25 (0.01)
4.34 (0.04)	9.31 (0.40)	1.25 (0.04)	4.91 (0.42)	1.99	13.2	1.21 (0.01)	1.21 (0.01)
5.23 (0.1)					16.7	1.16 (0.03)	1.16 (0.03)
6.13 (0.1)					20.1	1.12 (0.01)	1.12 (0.01)
6.64 (0.1)					23.5	1.07 (0.03)	1.07 (0.03)
Compressed powder tablet at 100 MPa							
0.94 (0.30)					3.10	1.08 (0.03)	1.08 (0.03)
2.64 (0.04)					6.46	1.45 (0.03)	1.45 (0.03)
3.65 (0.03)					9.91	1.31 (0.01)	1.31 (0.01)
4.51 (0.03)	8.63 (0.31)	1.25 (0.04)	4.91 (0.42)	1.99	13.2	1.21 (0.01)	1.21 (0.01)
5.57 (0.01)					16.7	1.18 (0.00)	1.18 (0.00)
6.33 (0.10)					20.1	1.12 (0.01)	1.12 (0.01)
7.24 (0.04)					23.5	1.09 (0.01)	1.09 (0.01)
Compressed powder tablet at 120 MPa							
0.35 (0.02)					3.10	0.39 (0.02)	0.39 (0.02)
0.71 (0.10)	8.63 (0.31)	1.25 (0.04)	4.91 (0.42)	1.99	6.46	0.38 (0.05)	0.38 (0.05)
1.03 (0.02)					9.91	0.36 (0.08)	0.36 (0.08)

1.31 (0.02)					13.2	0.34 (0.06)	0.34 (0.06)
1.56 (0.04)					16.7	0.32 (0.08)	0.32 (0.08)
1.82 (0.01)					20.1	0.31 (0.02)	0.31 (0.02)
2.16 (0.02)					23.5	0.32 (0.03)	0.32 (0.03)
			Compressed powder tablet at 140 MPa				
0.16 (0.05)					3.10	0.17 (0.07)	0.17 (0.07))
0.50 (0.12)					6.46	0.26 (0.05)	0.26 (0.05)
0.77 (0.13)					9.91	0.26 (0.05)	0.26 (0.05)
0.97 (0.13)	8.06 (0.31)	1.25 (0.04)	4.91 (0.42)	1.99	13.2	0.24 (0.04)	0.24 (0.04)
1.17 (0.04)					16.7	0.23 (0.09)	0.23 (0.09)
1.34 (0.08)					20.10	0.22 (0.13)	0.22 (0.13)
1.96 (0.01)					23.5	0.28 (0.03)	0.28 (0.03)
			Compressed powder tablet at 160 MPa				
0.17 (0.04)					3.10	0.18 (0.04)	0.18 (0.04)
0.33 (0.06)					6.46	0.17 (0.03)	0.17 (0.03)
0.47 (0.05)					9.91	0.15 (0.02)	0.15 (0.02)
0.59 (0.03)	8.06 (0.31)	1.25 (0.04)	4.91 (0.42)	1.99	13.2	0.15 (0.01)	0.15 (0.01)
0.71 (0.04)					16.7	0.14 (0.01)	0.14 (0.01)
0.85 (0.30)					20.10	0.14 (0.05)	0.14 (0.05)
0.94 (0.12)					23.5	0.13 (0.02)	0.13 (0.02)
			Compressed powder tablet at 180 MPa				
0.17 (0.01)					3.10	0.17 (0.01)	0.17 (0.01)
0.30 (0.01)					6.46	0.15 (0.01)	0.15 (0.01)
0.46 (0.2)					9.91	0.15 (0.05)	0.15 (0.05)
0.57 (0.01)	8.06 (0.31)	1.25 (0.04)	4.91 (0.42)	1.99	13.2	0.14 (0.01)	0.14 (0.01)
0.80 (0.10)					16.7	0.16 (0.09)	0.16 (0.09)
0.95 (0.02)					20.10	0.15 (0.01)	0.15 (0.01)
1.10 (0.01)					23.5	0.10 (0.01)	0.10 (0.01)
			Compressed powder tablet at 200 MPa				
0.125 (0.01)					3.10	0.13 (0.01)	0.13 (0.01)
0.31 (0.01)					6.46	0.15 (0.00)	0.15 (0.00)
0.45 (0.01)					9.91	0.14 (0.00)	0.14 (0.00)
0.60 (0.04)	7.64 (0.42)	1.25 (0.04)	4.91 (0.42)	1.99	13.20	0.14 (0.01)	0.14 (0.01)
0.73 (0.05)					16.70	0.14 (0.01)	0.14 (0.01)
0.86 (0.05)					20.10	0.13 (0.01)	0.13 (0.01)
1.01 (0.01)					23.5	0.14 (0.01)	0.14 (0.01)

Error at 68.2% of confidence interval (in brackets).