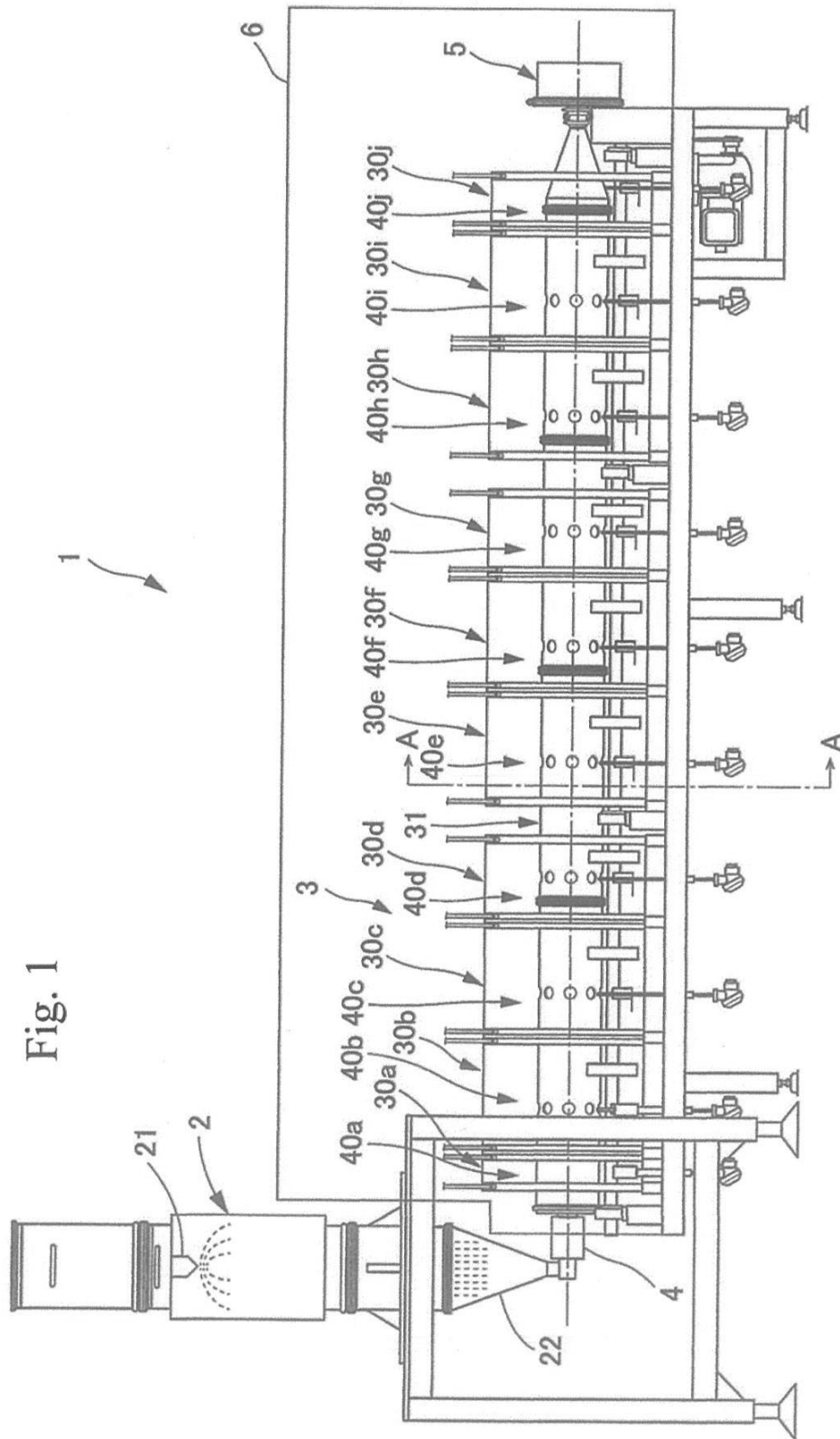




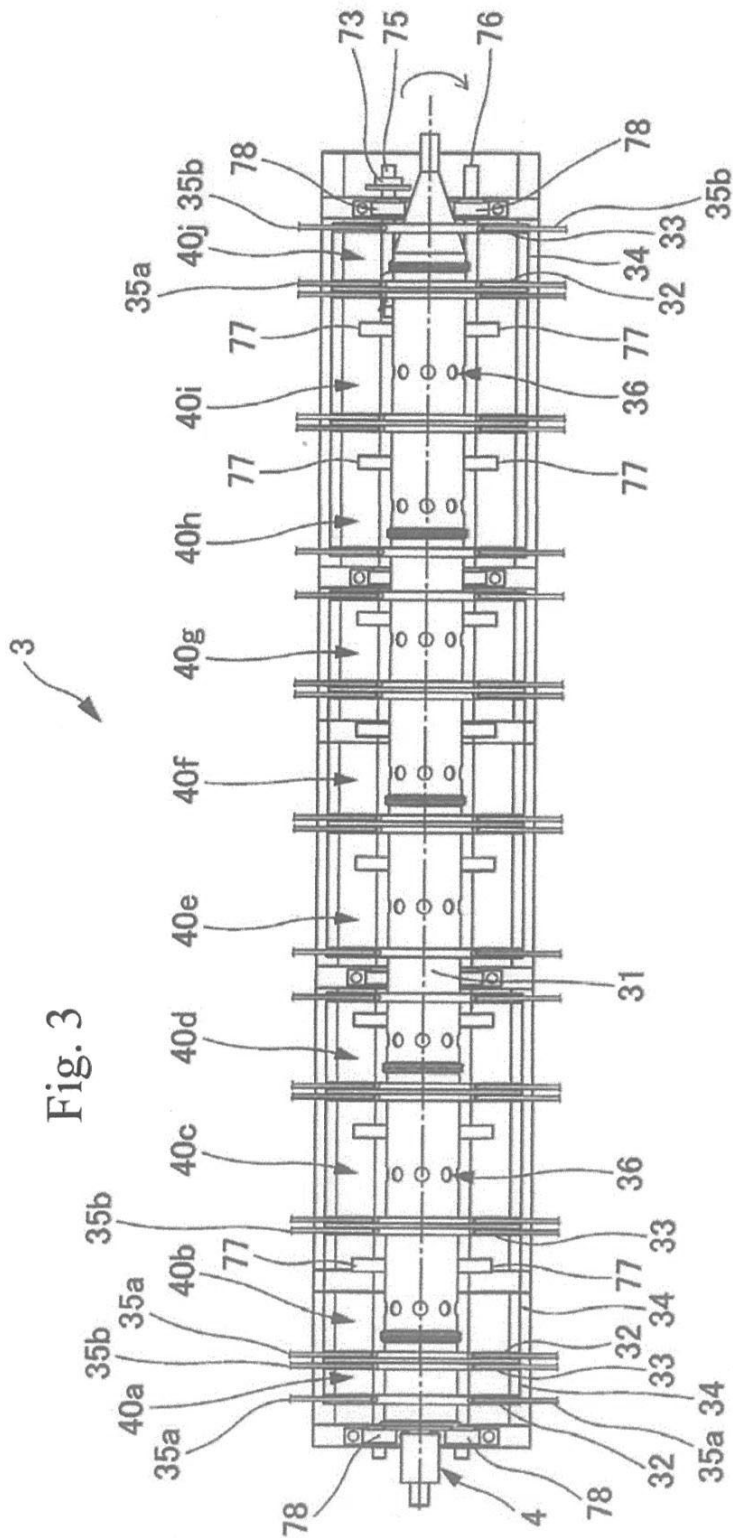


Fig. 4A

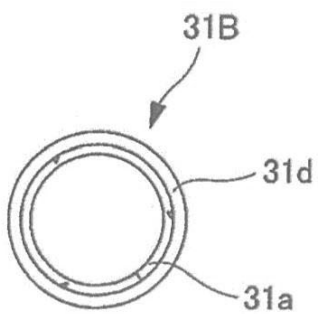
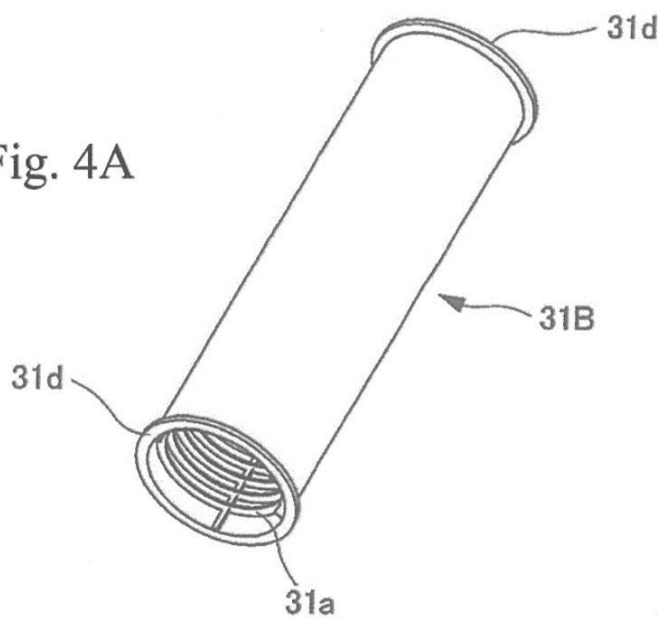


Fig. 4C

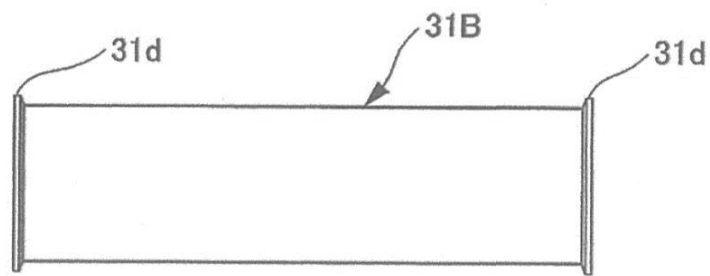


Fig. 4B

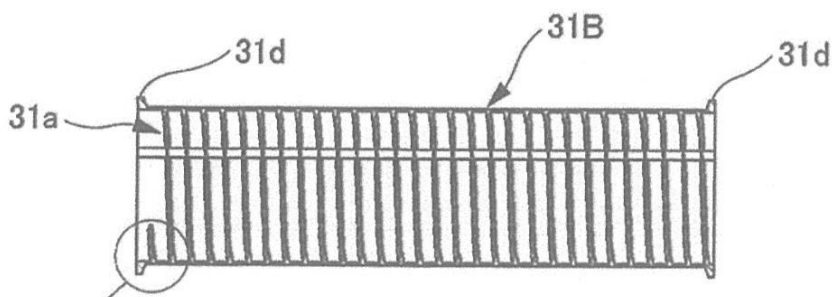


Fig. 4D

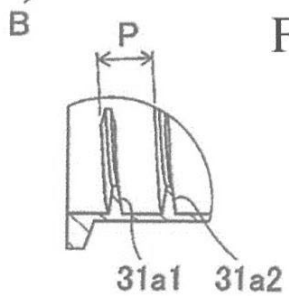


Fig. 4E

Fig. 5

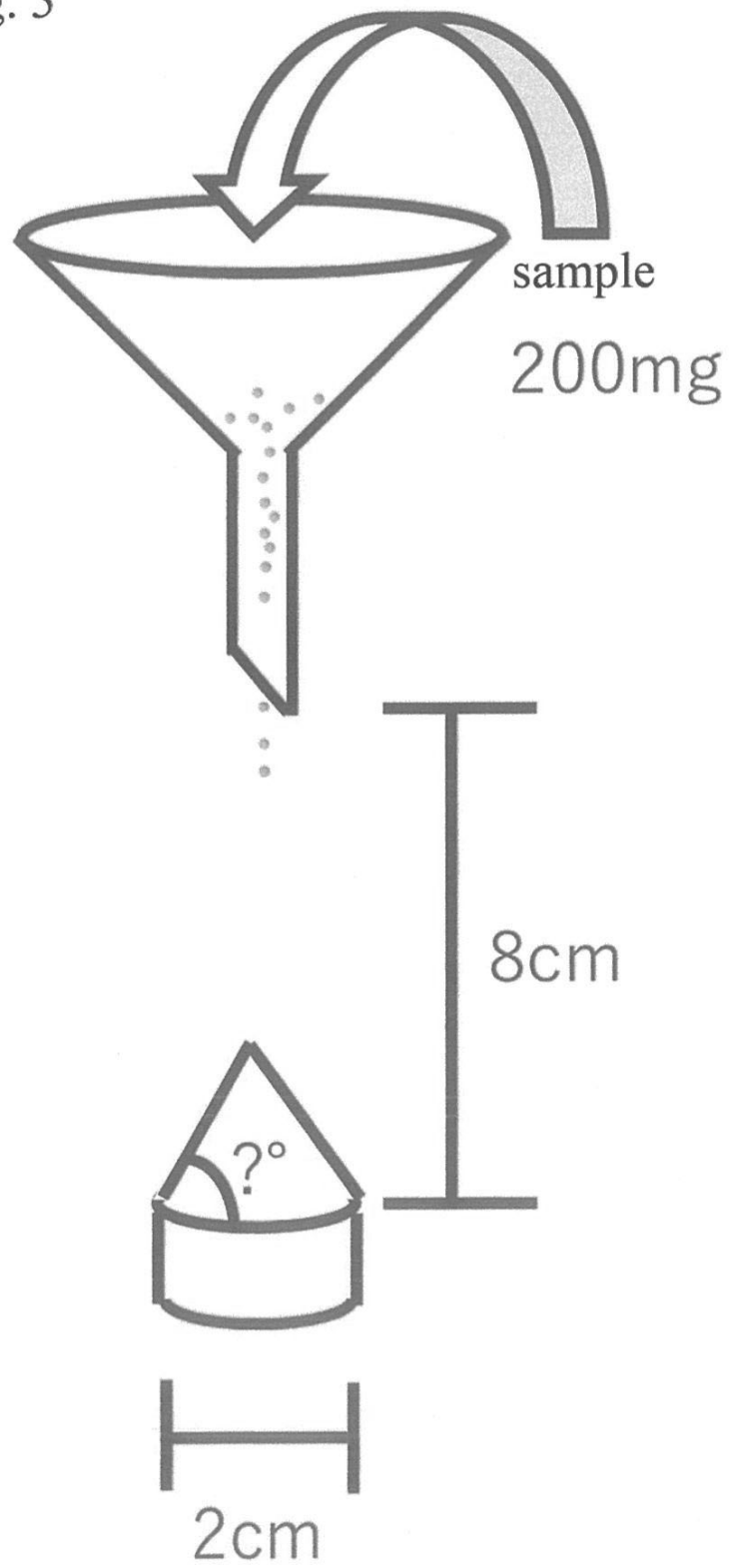


Fig. 6

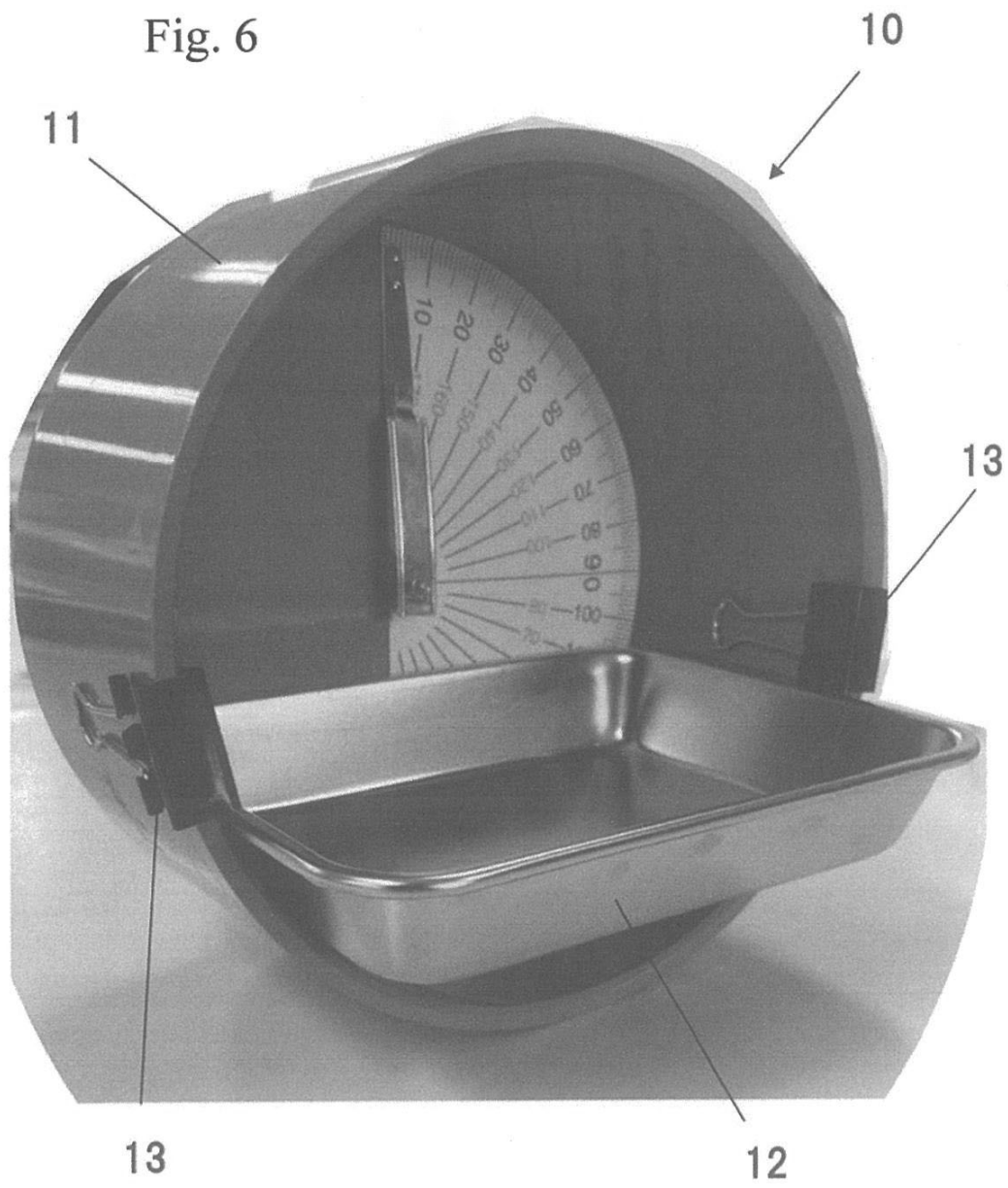


Fig. 7

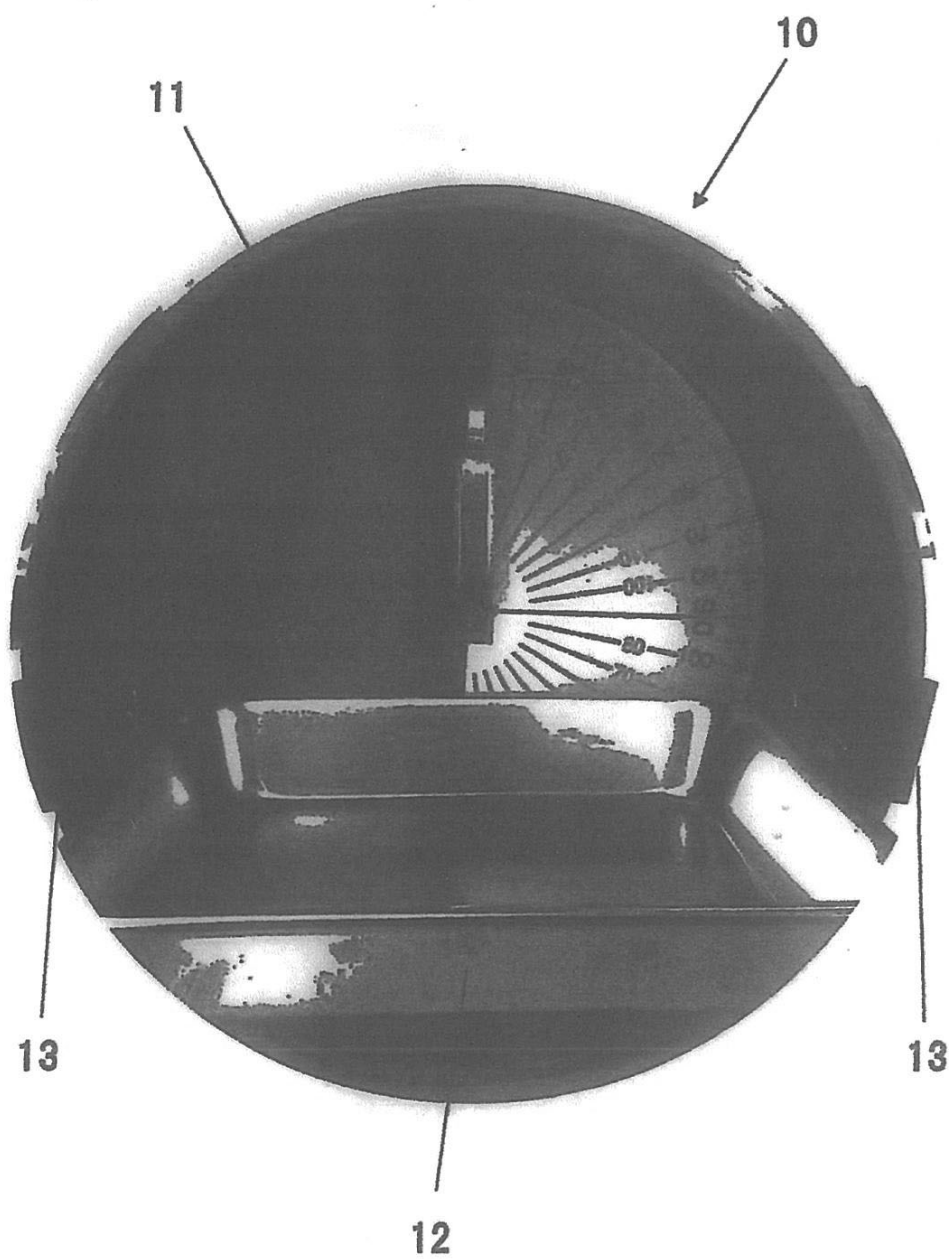


Fig. 8

Raw data of repose angle and flow-start angle

sample No.	sample name	No.	repose angle 1 (°)	repose angle 2 (°)	repose angle 3 (°)	repose angle 4 (°)	average of repose angle at four positions (°)	average of repose angle (°)	standard deviate of repose angle	flow-start angle (°)	average of flow-start angle (°)	standard deviate of flow-start angle
1	SFD 10%-Mannitol/10%-sucrose	1	36	35.7	41.3	33.1	36.5	40.5	2.8	39	36.5	6.1
		2	47.3	40.2	43.1	40.6	42.8			31		
		3	44	42.4	42.5	40	42.2			44		
		4	42.6	36.2	45.7	37.6	40.5			32		
2	SFD 8%-D-Mannitol/2%-sucrose	1	43.3	32.6	38.1	31.3	36.3	38.7	2.4	23	27.3	3.8
		2	40.8	39.6	38.3	36.5	38.8			29		
		3	43.3	35	45.6	40.3	41.1			30		
3	SFD 5%-D-Mannitol/5%-trehalose	1	41.6	42	44.3	40.9	42.2	40.2	3.8	43	38.0	4.4
		2	47	38	41.2	43.9	42.5			36		
		3	32.7	40.8	31.2	38.6	35.8			35		
4	SFD 5%-erythritol/5%-sucrose	1	36.2	36.2	43.1	33.4	37.2	35.7	2.3	34	34.3	0.6
		2	35	42.1	36.2	33.5	36.7			35		
		3	33.6	33.5	32.1	33	33.1			34		
5	SFD 5%-D-Mannitol/5%-sucrose	1	40	36.2	41.2	44	40.4	37.2	2.8	36	37.0	5.6
		2	37.5	34.4	34.7	37	35.9			33		
		3	36.6	32.1	33	39.4	35.3			40		
										39		
6	SFD 10%-trehalose	1	48.9	48.6	48.1	50.7	49.1	49.4	0.7	27	31.3	4.5
		2	45.4	48.3	51.4	50.2	48.8			31		
		3	49.6	53.1	50	47.9	50.2			36		
7	SFD 10%-sucrose	1	55.1	52.3	52.2	54.7	53.6	49.9	4.6	45	41.0	3.6
		2	47.5	48.7	53.5	55.6	51.3			38		
		3	45.6	46.8	43.2	43.6	44.8			40		
8	SFD 10%-D-Mannitol	1	44.8	46.4	47.6	45.9	46.2	47.7	5.9	32	40.3	6.9
		2	52.6	45.4	48.8	46.2	48.3			37		
		3	55	54.5	56.5	55.3	55.3			46		
		4	40	43.4	48.5	32.1	41.0			46		
reference example 1	Tabletose (MEGGLE)	1	30.8	31.5	29.8	30	30.2	31.2	1.1	29.1	29.6	0.6
		2	33.3	32.9	32.9	30.7	32.5			30.3		
		3	32.8	31.9	28.5	31.1	31.1			29.5		
reference example 2	potato starch (Sun Smile)	1	47.4	48.1	47.4	47.4	47.6	48.0	0.4	30.4	31.1	0.6
		2	47.7	48.3	49.3	48	48.3			31.3		
		3	49.8	48.2	47.9	46.8	48.2			31.5		

Fig. 9

Raw data of repose angle and flow-start angle

sample No.	sample name	No.	repose angle 1 (°)	repose angle 2 (°)	repose angle 3 (°)	repose angle 4 (°)	average of repose angle at four positions (°)	average of repose angle (°)	standard deviate of repose angle	flow-start angle (°)	average of flow-start angle (°)	standard deviate of flow-start angle
9	SFD 10%-erythritol	1	37	28.6	34.1	30.6	32.6	31.9	0.8	42	46.7	5.7
		2	25.7	24.3	39	35	31.0			45		
		3	31.5	36	32.4	28.2	32.0			53		
10	FD 5%-D-Mannitol/5%-trehalose	1	46.5	45.6	45.5	46.2	46.0	46.5	3.1	56	55	5.6
		2	50.8	48.9	52.6	45.4	49.4			60		
		3	45	42.3	42.4	40.1	42.5			49		
		4	44.8	45.9	45.2	57.1	48.3					
11	FD 5%-D-Mannitol/5%-sucrose	1	35.5	45.1	38.1	37.6	39.1	36.9	3.9	38	54.6	13.1
		2	42	38.4	37.6	36	38.5			74		
		3	28.3	29.3	29.6	32.6	30.0			51		
		4	40	31.4	40.2	39.8	37.9			52		
		5	38	37.6	39.2	41.7	39.1			58		
12	FD 10%-erythritol	1	30.6	24.9	32.5	23.0	27.8	30.5	3.1	41	46.7	4.9
		2	37.4	32	36.4	29.6	33.9			49		
		3	28.8	28.3	31	31.2	29.8			50		
13	FD 5%-erythritol/5%-sucrose	1	36.2	41.7	36.1	34.8	37.2	35.7	1.3	57	54	4.4
		2	34.5	33.3	35.4	35.7	34.7			56		
		3	34.8	34.6	36.5	35.1	35.3			49		
14	FD 10%-trehalose	1	68	64.3	61.5	66.4	65.1	59.4	5.5	52	58	5.3
		2	57.3	64.6	56.3	58.0	59.1			60		
		3	56.5	54.8	49.7	55.6	54.2			62		
15	FD10%-D-Mannitol	1	37	36.4	37.0	35.2	36.4	39.7	3.1	47.5	52.3	7.5
		2	40.3	37.4	38.4	44.5	40.2			61		
		3	46.5	40.1	41.4	42.1	42.5			48.5		
16	FD 10%-sucrose	1	53.1	51.6	54.7	51.2	52.7	50.6	2.0	60	63.7	3.5
		2	48.8	48.2	50.4	47.2	48.7			64		
		3	50.3	43.9	47.7	60.0	50.5			67		
17	FD 8%-D-Mannitol/2%-sucrose	1	43.5	34	40.3	37.5	38.8	36.3	2.6	52	57.3	8.4
		2	35	32.4	38.6	28.6	33.7			67		
		3	38.6	31.7	38.1	37.7	36.5			53		
reference example 3	rice flour (Hinokuni Foods)	1	51.4	51.5	49.8	53.4	51.5	52.1	0.8	38.6	38.2	0.4
		2	54.1	55.6	49.6	48.2	51.9			38		
		3	53.4	57.3	51.5	49.9	53.0			37.9		

Fig. 10

Analysis of fluidity

No.	sample name	repose angle [°] (A)	flow- start angle [°] (B)	repose angle – flow start	residual material [g]
1	SFD 10%-Mannitol/10%-sucrose	40.5	36.5	4.0	0.2
2	SFD 8%-D-Mannitol/2%-sucrose	38.7	27.3	11.4	0.2
3	SFD 5%-D-Mannitol/5%-trehalose	40.2	38.0	2.2	0.3
4	SFD 5%-erythritol/5%-sucrose	35.7	34.3	1.4	0.3
reference example 1	Tablettose (MEGGLE)	31.2	29.6	1.6	0.3
5	SFD 5%-D-Mannitol/5%-sucrose	37.2	37.0	0.2	0.4
reference example 2	potato starch (Sun Smile)	48.0	31.1	16.9	0.5
6	SFD 10%-trehalose	49.4	31.3	18.0	1.6
7	SFD 10%-sucrose	49.9	41.0	8.9	1.6
8	SFD 10%-D-Mannitol	47.7	40.3	7.4	1.6
reference example 3	rice flour (Hinokuni Foods)	52.1	38.2	13.9	2.7
9	SFD 10%-erythritol	31.9	46.7	-14.8	3.2
10	FD 5%-D-Mannitol/5%-trehalose	46.5	55.0	-8.5	3.5
11	FD 5%-D-Mannitol/5%-sucrose	36.9	54.6	-17.7	3.6
12	FD 10%-erythritol	30.5	46.7	-16.2	3.7
13	FD 5%-erythritol/5%-sucrose	35.7	54.0	-18.3	3.7
14	FD 10%-trehalose	59.4	58.0	1.4	5.4
15	FD 10%-D-Mannitol	39.7	52.3	-12.6	5.7
16	FD 10%-sucrose	50.6	63.7	-13.1	5.7
17	FD 8%-D-Mannitol/2%-sucrose	36.3	57.3	-21.0	7.1

FD means shelf-type freeze-drying. SFD means spray freeze-drying.