A 8 a - Particle Size Distribution by Sieving

GEA NIRO® Method No. A 8 a

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1. Definition

The powder sample is divided into fractions with different particle sizes by sieving.

2. Scope

The method is to be used for agglomerated milk powders, rewet agglomerated milk powders and other free-flowing powders. When modified, the method can also be used for fatty and sticky products – see Remarks 9.1.

3. Principle

Powder samples are sieved through a number of sieves with different mesh sizes using a horizontally oscillating movement.

4. Apparatus

1. Balance - sensitivity ± 0.1 mg.

2. Shaker for sieves, e.g. as supplied by Engelsmann, Germany (Fig. 1).

3. Brush.

4. Sieves with different mesh sizes, lid and base.

5. Reagents

None.

6. Procedure

1. Select the sieves, weigh them and the base, and place them on the base in decreasing order.

Agglomerated milk powder		Rewet agglomerated milk powder	
m	U.S. Mesh	m	U.S. Mesh
500	35	2000	10
355	45	1000	18
250	60	710	25
212	70	500	35
180	&am p;nb sp; 80	355	45
150	100	250	60
125	120	150	100

2. Weigh out 50.0 g of powder and transfer it to the upper sieve.

3. Set the lid on the upper sieve and place the stack on the base of the shaker. Secure the stack and shake for 5 minutes.

4. Weigh each sieve and the base with the powder. Make sure that no powder sticking to the bottom of the sieve.

5. If >20% powder is found on the upper sieve or on the base, an additional sieve with a larger or smaller mesh size is added for a new sieve analysis.

7. Result

The result can be found in two different ways:

1. Each fraction is indicated as a percentage of the total weight.

; a = weight of powder on the sieve

; w = total weight of powder

Results are reported with 1 decimal.

Example:

% powder	sieve size, m
0.1	>500
5.2	>355 - ≤500
0.4	>250 - ≤355
23.1	>212 - ≤250
30.4	>180 - ≤212
16.4	>150 - ≤180
10.2	>125 - ≤150
3.2	>90 - ≤125
1.0	≤ 90

2. Accumulation of the numbers found on individual sieves:

% powder	sieve size, m	;	% powder	sieve size, m
0.1	> 500		1.0	< 90
5.3	> 355		4.2	<125
15.7	> 250		14.2	< 150
38.8	> 212		30.8	< 180
69.2	> 180		61.2	< 212
85.6	> 150		84.3	< 250
95.8	> 125		94.7	< 355
99.0	> 90		99.9	< 500

8. Reproducibility

N/A

9. Remarks

1. Fatty and sticky products will lump together and not pass through the sieves, especially for mesh sizes <150 µ. To prevent this, a free-flowing agent (e.g sodium aluminium silicate - Tix-O-Sil or Cal-Flo) can be used. Normally, 1-2% of free-flowing agent is suitable to prevent lumping on the sieves. Before sieving, gently mix the free-flowing agent with the powder in a beaker. When the correct amount of free-flowing agent is used, it will disperse evenly, so that no correction is needed when calculating the particle size distribution.

The use of free-flowing agent must be noted together with the results.

2. The particle size distribution of agglomerated and brittle powder will depend on the sieving time. If any deviation from this procedure is decided, specify it together with the results.

10.   Literature

- GEA Niro Research Laboratory

- Allen Terence, Particle Size Measurement, 2. edition 1975 by Chapman and Hall Ltd.