

## Powder Bulk Volume GEA Niro analytical method A 2 b

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### 1. Definition

The bulk volume of a powder is the volume of the powder divided by the weight, normally expressed in ml/100g powder.

### 2. Scope

The method is to be used for milk powders and all other dried milk products.

### 3. Principle

100 g sample is filled into a glass cylinder and tapped in a Stampf-volumeter. The results of bulk density must be identified as loose, tapped 100 times or tapped 1250 times.

### 4. Apparatus

4.1 Balance - sensitivity 0.1 mg.

4.2 200 ml measuring glass cylinder.

4.3 Stampf-volumeter, e.g. made by [Engelsmann](#), Germany (Fig. 1).

4.4 Brush

### 5. Reagents

None.

### 6. Procedure

6.1 Weigh out exactly 100 g of powder, and transfer it to the measuring cylinder. Avoid shaking or tapping the cylinder.

6.2 Level off the surface of the powder with the spatula.

6.3 Record the volume ( $v_1$ ). The volume of the powder indicates "*loose/poured bulk volume*".

6.4 Tap the cylinder 100 times in the Stampf-volumeter.

6.5 Record the volume ( $v_2$ ). The volume of the powder indicates "*tapped powder bulk volume*".

6.7 Continue tapping the sample further 1150 times in the Stampf-volumeter.

6.8 Record the volume ( $v_3$ ). The volume of the powder indicates "*tapped to the extreme powder bulk volume*".

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#### 7. Result

The results are expressed as:

- Loose/poured bulk volume - tapped 0 times.
- Tapped bulk volume - tapped 100 times.
- Tapped to the extreme bulk volume - tapped 1250 times.

$$\text{Bulk Volume (BV)} = v_x$$

#### 8. Reproducibility

- ± 5 ml/100 g for loose bulk volume.
- ± 2 ml/100 g for tapped 100 and 1250 times.

Unless other is stated, bulk density is made as single determination.

#### 9. Remarks

- 9.1 Bulk density depends on water content and particle size. Avoid adsorption or desorption of water before determination.
- 9.2 To obtain reliable results, make sure the powder has room temperature when analysing.
- 9.3 Powder bulk volume can easily be converted into powder bulk density by use of the formula:

$$\text{Bulk density (BD)} = \frac{100}{BV} \text{ [g/ml]}$$

BV = bulk volume of 100 g powder in ml/100g

100 = weight of powder sample in g

Calculate the result to 2 decimal places.

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10. Literature

- [GEA Niro Research Laboratory](#)
- [IDF Standard 134A:1995](#) - Dried milk and dried milk products - Determination of bulk density.
- Svarovsky L., Powder Testing Guide: Methods of measuring the physical properties of bulk powders. ISBN 1851661379, Elsevier Science (1987).



Fig. 1 Stampf-volumeter

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