

Insolubility Index

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1. Definition

The Insoluble Index is a measure for the ability of a powder to dissolve in water. It is defined as the volume of sediments in ml after centrifuging.

2. Scope

This method is normally used for skimmed milk, whole milk and sweet buttermilk powder, but can also be applied to other soluble, dried dairy products.

3. Principle

The powder is dissolved in water at a certain temperature and centrifuged. The supernatant is removed and replaced by water, and is centrifuged again before reading the volume of insoluble residue.

4. Apparatus

- 4.1 Balance, sensitivity 0.1 g.
- 4.2 Thermometer, sensibility $\pm 0.2^{\circ}\text{C}$.
- 4.2 Solubility Index Mixer, [Snijders](#), The Netherlands, or equivalent. Speed: 3800-4000 rpm.
- 4.3 Centrifuge, e.g. Funke-Gerber Super Quatro. The speed depends on the diameter from the bottom of the centrifugal glass to that of the diametrically opposite glass. See Table 1.
- 4.4 50 ml centrifuge glass, graduated.
- 4.5 Vacuum pump.
- 4.6 Spatula.
- 4.7 Wire.

5. Reagents

Defoaming agent: Octylalcohol or diglycol laurate.

6. Procedure

- 6.1 Amount of powder:

Whey:	6 g
Skimmed milk:	10 g
Whole milk:	13 g
- 6.2 Pour 100 ml of water with a temperature of $24^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ into the mixer jar. Check the temperature before adding the powder into the water.
- 6.3 Add 2-3 drops of de-foaming agent.

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- 6.4 Mix for 90 seconds at 3800-4000 rpm.
- 6.5 Wait 15 min. Stir with a spatula before filling the solution in two centrifuge glasses to the 50 ml mark.
- 6.6 Centrifuge the solution for 5 min. at the required speed.
- 6.7 Use of a vacuum pump to suck up all sediment-free liquid that is more than 5 ml above the sediment layer. Fill the glasses with water to the 50 ml mark. Disperse the sediment into the water phase with a piece of wire.
- 6.8 Centrifuge for 5 min. at 900 rpm and read the amount of sediment in ml.

7. Results

Insolubility Index = ml sediment.

The average value of the two determinations is calculated, and the result is recorded to 1 decimal place.

8. Reproducibility

± 0.1 ml for insolubility index < 1.0 ml.

± 0.2 ml for insolubility index > 1.0 ml.

9. Remarks

The Insolubility Index is obtained from 50 ml of reconstituted powder.

10. Literature

- [GEA Niro Research Laboratory](#)
- [IDF Method 129A:1988](#)

Table 1: Centrifugal speed depends on the diameter from the bottom of the centrifuge glass to that of the diametrically opposite centrifuge glass.

Diameter		Speed
(mm)	(inches)	(r.p.m.)
254	10	1075
305	12	980
356	14	909
406	16	848
457	18	800
508	20	759
559	22	724
610	24	695

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