METHOD TO ESTIMATE RECONSTITUTION OF FOOD POWDER IN LIQUID

Foods

INTRODUCTION

The dissolution ability of a dry powder in a liquid depends on many parameters including wettability, sinkability, dissolution, or dispersibility. These parameters affect the customer perception of the overall product quality.

A large range of food powders exist, such as nutritional powder, dehydrated milk, baby milk, chocolate milk, beverages...

In this application note, we propose a methodology to assess the dry powder quality for reconstitution in liquid.

METHOD

The efficiency of 3 different food powders is assessed with a quick and simple protocol: a glass cell is filled with 15 mL of distilled water and 2 g of powder is deposited on the water. No stirring is applied on the product.

Food powder 1	**Horlicks (GSK)**
Food powder 2	**Milo (Nestlé)**
Food powder 3	**Bourn Vita (Cadbury)**

Turbiscan® measurement starts just after powder layer is deposited. The measurement is performed at 25°C. The following graph displays a typical Turbiscan profile obtained.

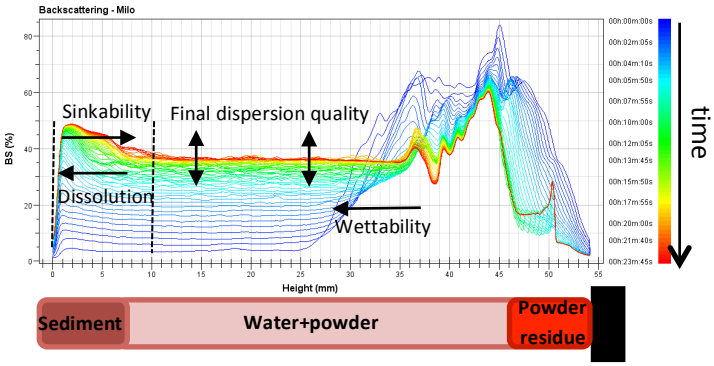


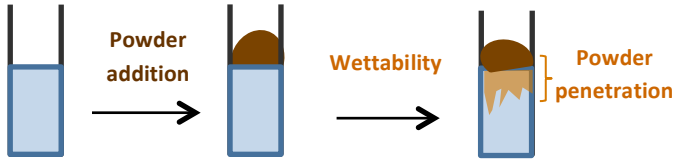
Figure 1: Evolution of the transmission signal for food powder 2 and schematic of the glass cell after 30 minutes

This graph shows information regarding the **wettability** of the powder, the **sinkability**, the **dissolution power** and the final **dispersion quality**.

RESULTS

Wettability

The wettability influences the speed of penetration of the powder layer in the water volume. The wettability level is directly linked to the backscattering peak thickness speed formation under the powder.



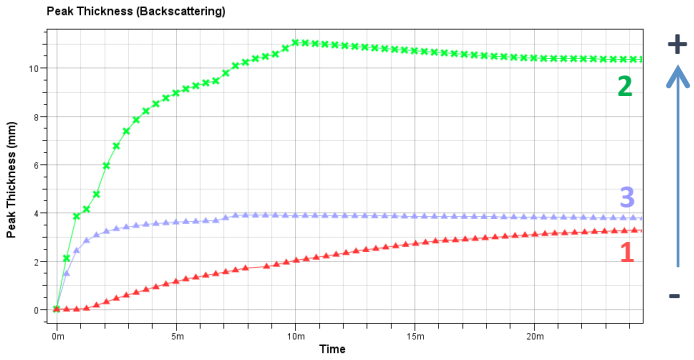


Figure 2: Peak thickness for powders 1, 2 and 3

Sample	Slope of peak thickness (mm/h)
Food powder 1	16
Food powder 3	88
Food powder 2	99

Wettability
-
+

These results show that speed of peak formation (directly linked to wettability) increases from sample 1 to 3 and is the best for sample 2.

Sinkability

The sinkability corresponds to the ability to overcome the surface tension of water and sink into water after passing through the surface and so forming a sediment layer. Sinkability is directly linked to the peak formation speed at the bottom of the cell.

The following graph displays the backscattering peak thickness obtained at the bottom of cell, corresponding to the sediment layer formation.

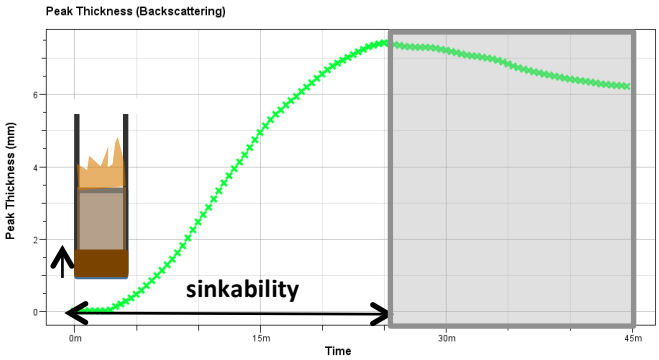


Figure 3a: Peak thickness at the bottom of the cell for sample 2

The slope of the bottom peak thickness gives the speed of peak formation directly linked to the sinkability of the powder.

Sample	Slope of peak thickness in the increase of the curve (mm/h)
Food powder 3	8
Food powder 1	12
Food powder 2	12

Sinkability: - ↓ +

This table shows that powder 2 gives the greatest speed, meaning the best sinkability.

Dissolution power

The dissolution follows the sinkability, it corresponds to the sediment layer decrease. Indeed when the sediment dissolves in water, its thickness decreases.

Figure 3b gives additional information about the dissolution of the powder. This parameter can be assessed by calculating the slope of the peak thickness in the decreasing zone of the curve. The higher is the slope, the best is the dissolution power.

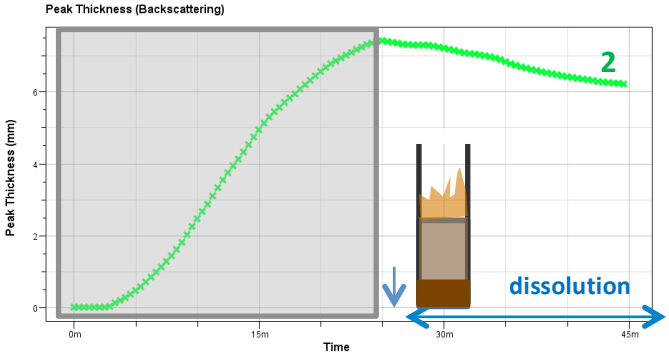


Figure 3b: Peak thickness at the bottom of the cell for sample 2

Sample	Slope of peak thickness in the decrease of the curve (mm/h)
Food powder 1	0
Food powder 3	-0.23
Food powder 2	-4.2

Dissolution: - ↓ +

This table shows that powder 2 has the greatest slope (in absolute), meaning the best dissolution power. Other powders lead to similar slope values close to 0, meaning no dissolution.

Final dispersion quality

The quality required for these powders is a quick and easy dispersion. The final dispersion quality is compared to a suspension prepared at 60°C under stirring. The Turbiscan signal in backscattering in the middle of the sample is directly linked to the dispersion state:

Sample	Turbiscan signal* after 20 min at 25°C (%)	Turbiscan signal* for complete dispersion at 60°C (%)	Dispersibility ratio (%)
Food powder 1	4	21	19
Food powder 3	3	10	30
Food powder 2	36	40	90

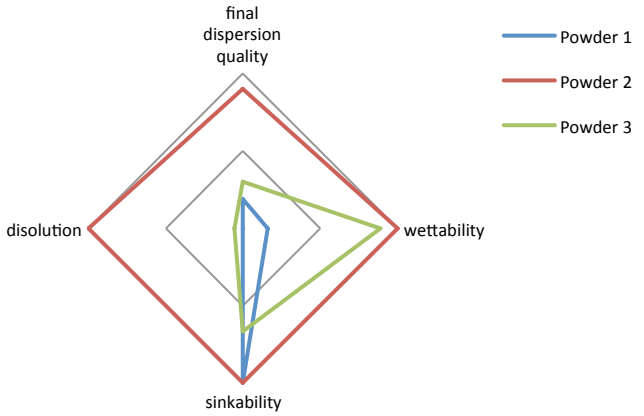
Final Dispersion quality: - ↓ +

*backscattering level in the middle of sample

This table shows that dispersion efficiency increases from sample 1 to 3 and is much better for sample 2.

SUMMARY

This Application Note shows a quick and simple methodology to qualify the reconstitution of food powders **in only one single experiment.** The following graph summarizes the results obtained.



Food powder 2 displays the best performance for the four criteria of powder efficiency: wettability, sinkability, dissolution and final dispersion state at rest.