Application Note - Colour Measurement of powdered products

Spectrophotometers and Colorimeters

Recommended models for powders, grains, granules, beans

In the food and beverage industry, powdered products such as cocoa, milk powder, spices, flour, and coffee present unique challenges when it comes to quality control. Unlike liquids or solid raw materials, powders often have irregular particle sizes, varying degrees of compactness, and surface texture inconsistencies that make visual assessment unreliable and inconsistent. Even slight variations in colour can signal differences in roasting, drying, blending, or storage conditions, which in turn may affect not only the product's appearance but also consumer perception of its freshness, authenticity, and overall quality.

Accurate and objective colour measurement of powdered products is therefore essential for maintaining high standards of quality control. By implementing colour measurement and digital colour standards, manufacturers can ensure batch-to-batch consistency, detect deviations at an early stage, and reduce costly waste caused by non-conforming products. Beyond production efficiency, reliable colour measurement also plays a key role in safeguarding brand identity and meeting regulatory standards.

Spectrophotometers and colorimeters (chroma meters) are highly beneficial for powdered colour measurement because they provide objective, repeatable, and quantitative data that overcomes the limitations of visual inspection. Powders often present challenges due to their uneven texture, particle size variations, and tendency to scatter light. Both instruments are designed to minimise these inconsistencies by averaging across a defined measurement area, delivering accurate colour data and colour difference data (such as CIE L*a*b* values).

Spectrophotometers offer the advantage of full spectral analysis, allowing deeper insights into subtle colour differences, while colorimeters provide fast and user-friendly assessments ideal for routine quality checks. Together, they help manufacturers maintain batch-to-batch consistency, detect off-spec products early, and ensure consumer trust by delivering powdered products with reliable and appealing colour quality.

Colour Measurement in the Food Industry

Recommended Models

Accurate colour measurement ensures consistent quality across food products. Konica Minolta's CM-5, CR-410, and CM-17d with accessory CM-A184 deliver reliable, repeatable results for diverse samples from powders to roasted goods.

Spectrophotometer CM-17d

Chroma Meter CR-410

Spectrophotometer CM-5

Portable Chroma Meter CR-410

Ideal for Evaluating Uneven Food Samples

The CR-410 is designed for uneven or coarse food samples such as coffee beans, grains, sugar, and tea leaves. With a large 50 mm measurement area, it captures representative colour data quickly and reliably – ideal for production and quality control environments.

Benchtop Spectrophotometer CM-5

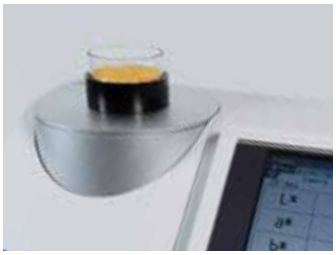
One device – endless possibilities

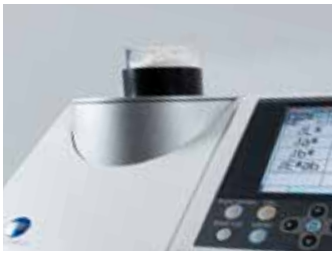
The CM-5 enables precise, repeatable colour measurement of powders, granules, pastes and liquids. Its top-class optical performance and simple sample placement make it ideal for laboratory use.

- Reflectance and transmittance measurements
- Accurate colour measurement made easy – anytime, anywhere, by anyone

Powder reflectance colour measurement

Reliable colour measurement is possible across a wide range of sample textures, from **fine** to **coarse** powders.





Fine: flour, ground spices, matcha, cocoa powder, baking mixes, coffee etc.
Coarse: coffee beans, legumes, oilseeds, nuts, grains, etc.

Portable Spectrophotometer CM-17d with granular sample accessory CM-A184

Accurate and effortless colour control for powders

The CM-17d portable spectrophotometer, combined with the CM-A184 granular-materials accessory, enables accurate and repeatable colour measurement of powdered or granular products. The accessory stabilises the sample and protects the instrument, ensuring consistent readings by minimising air gaps and particle irregularities.

Its high measurement accuracy, repeatability and inter-instrument agreement (IIA within ΔEab 0.12, repeatability within ΔEab 0.02) make it better suited when tight colour control is required (e.g., batch-to-batch consistency, supplier validation) in a food powder environment.

Specifications

CM-5 | CR-410 | CM-17d

Model	CM-5		CR-410	CM-17d
Measuring Methods	Spectrophotometric Method		Tristimulus Method	Spectrophotometric Method
Measurement Diameter	Reflection	LAV: Ø30mm MAV: Ø8mm SAV: Ø3mm	Ø50mm	MAV:Ø8 mm/Ø11 mm SAV:Ø3 mm/Ø6 mm
	Transmission	Ø20mm	–	–
Repeatability	Within ΔE*ab 0.04*1		Within ΔE*ab0.07*1	Within ΔE*ab 0.02*1
Inter-instrument agreement	ΔE*ab: 0.15*2		ΔE*ab: 0.8*2	ΔE*ab 0.12
Sample	Powders	✓	✓	✓
	Solid	✓	✓	✓
	Liquid	✓	–	–

*1 *After White Calibration: 30 Measurements of the White Plate at 10- Second Intervals*

*2 *Average Values of 12 Colours in BCRA Series II Tiles*