

Direct Moisture and Fat Analysis of Coconut Products



Abstract

Coconuts can be processed into countless products, including coconut milk, coconut flour, dried meat (copra) and coconut oil. At each step, it is critical for processors to properly control moisture and fat content. In this application note, we show how the SMART 6™ and the ORACLE™ systems allow processors to rapidly and directly analyze coconut samples for moisture and fat, allowing for real-time optimization of the process and of production profitability.

Introduction

Coconut is a versatile agricultural product with countless health benefits. There are many value-added products that processors can derive from coconut, including coconut oil, coconut water, coconut milk, desiccated coconut and coconut flour. These products find a wide range of applications in food & beverages and cosmetic & personal care industries. Huge demand for coconut oil in the cosmetics industry and a significant increase in its popularity in food applications are likely to drive the coconut oil market. Active and health-conscious consumers have shifted their preference toward natural alternatives to caffeinated and sugar-based energy drinks. Hence, the demand for coconut water as a natural energy drink is growing rapidly, due to its nutritional properties, such as electrolytes and nutrients. Coconut flour offers food manufacturers with a health-conscious, gluten-free alternative to wheat flour.

Each individual product created during coconut processing must be carefully controlled for moisture (or total solids) and fat. For example, coconut flour with too much moisture will be prone to spoilage and agglomeration. Additionally, controlling fat content throughout the process ensures efficient extraction of coconut oil, which is a high-value product. The SMART 6 and ORACLE systems combine rapid moisture and fat analysis to provide coconut processors, and food & cosmetic manufacturers with direct, reliable results in approximately five minutes.

Method and Results

To evaluate the performance of the SMART 6 and ORACLE systems, a variety of coconut samples were gathered and analyzed: coconut oil, coconut milk, toasted coconut, and coconut flour. All samples, except for coconut oil, were analyzed for moisture content in the SMART 6 by drying at 105 °C until constant weight was reached. Moisture analysis time took an average of four minutes. Once moisture analysis was complete, all samples were placed in the ORACLE and temperature-conditioned for 30 seconds, before undergoing a 30-second fat scan. In all, the total test time was five minutes.

Table 1 (page 2) shows the repeatability of the SMART 6 for moisture analysis for each coconut product. Triplicate measurements of each sample resulted in an average standard deviation of 0.06%.

Table 1. Repeatability of SMART 6 for Percent Moisture Analysis of Coconut Products

Sample	SMART 6 Replicates			Average	STDEV	Reference	Difference
	1	2	3				
Desiccated Coconut	1.56	1.35	1.49	1.47	0.11	1.55	0.08
Coconut Flour	4.21	4.15	4.18	4.18	0.03	4.27	0.09
Coconut Concentrate	1.16	1.16	1.27	1.20	0.06	1.26	0.06
Coconut Milk	74.63	74.54	74.61	74.59	0.05	74.62	0.03

The repeatability of the ORACLE for fat analysis for coconut products is shown below in **Table 2**. The average standard deviation of all samples was 0.09%.

Table 2. Repeatability of ORACLE for Percent Fat Analysis of Coconut Products

Sample	ORACLE Replicates			Average	STDEV	Reference	Difference
	1	2	3				
Coconut Oil	99.99	100.00	100.00	100.00	0.01	99.87	0.13
Desiccated Coconut	67.41	67.30	67.57	67.43	0.14	67.15	0.28
Coconut Flour	12.73	12.80	12.74	12.76	0.04	12.83	0.07
Coconut Concentrate	65.58	65.66	65.67	65.64	0.05	65.34	0.30
Coconut Milk	19.85	19.88	19.91	19.88	0.03	19.82	0.06

Conclusion

The SMART 6 and ORACLE systems enable coconut processors and manufacturers (who use coconut products as ingredients) to rapidly analyze products from the beginning to the end of the process, optimizing production and profitability. By minimizing test time and providing precise and accurate results, users are able to implement true process control within the production process and optimize the manufacturing of coconut products in real-time.

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