

RAPID MOISTURE DETERMINATION FOR PALM OIL PRODUCTS

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Moisture content in palm products is an important process control parameter in a palm oil mill. The current standard procedure of determining the moisture content of palm oil samples is to weigh a sample, heat it in an oven at 103°C to drive off the moisture and reweigh. The loss in weight is presumed to be the amount of moisture that was present in the original sample. However, this is a lengthy procedure, requiring 4 hr of heating before result can be obtained. Some methods that warrant consideration are heating using microwave, infrared radiation and conductivity measurements.

An analytical method that requires little or no sample preparation and can be completed within a short time is much desired. An infrared moisture analyser has been evaluated and able to give results within 5-15 min compared to 4 hr or more by the conventional method. This method determines moisture content on the weight loss of a sample. The method uses direct infrared radiation instead of hot circulation air in dry oven. The infrared rays are absorbed by the sample and the absorbed energy causes the desired heating of the substance.

THE METHOD-IR MOISTURE ANALYSER

Any Infrared Moisture Analyser with the system component such as infrared radiator, balance display and data interface combined can be used.

The instrument operates on the thermogravimetric principle. The basis for the calculation of the moisture content is the weight loss of the sample at the end of drying. This method uses direct infrared radiation instead of hot circulation air to dry the sample. The infrared rays are absorbed by the sample and the absorbed energy causes the desired heating of the substance. Aluminum dishes of diameter 95 mm were used to contain samples for the tests.

Decomposition of the sample may occur if the drying temperature selected is too high, while low temperature required longer drying time. The time required for drying the sample ranges from 3 to 15 min (*Table 1*) and is dependent on the moisture content. The sample size has an influence on both the accuracy of the results and time. With large amount of sample, the moisture determination will take longer. *Table 2* shows the weight that is recommended for each sample.

ADVANTAGES OF THE IR MOISTURE ANALYSER OVER CONVENTIONAL OVEN HEATED METHOD

- The method is applicable to crude palm oil, palm fibre and palm kernel;
- Accurate determination for samples containing any moisture content (e.g. CPO: 0.1%, fibre: 30%, palm kernel: 6%); and
- Great reduction of analysis time - 15 min as compared to 4 hr by conventional heated air oven method.



TABLE 1. AVERAGE MOISTURE CONTENT OBTAINED BY TWO METHODS

Sample	Moisture content (%)		Time (min) by IR analyser
	IR analyser	Std. air oven	
Crude palm oil	0.11	0.10	2.5-5.0
	0.09	0.12	
	0.10	0.11	
	0.10	0.10	
Palm kernel	6.03	6.04	6.0-10.0
	5.97	5.84	
	5.86	5.95	
	6.07	6.00	
Fibre	30.44	29.73	10.0-15.0
	29.79	27.68	
	30.44	29.97	
	30.11	30.94	

Notes: * Average of three replications.
Temperature was set at 100°C.

TABLE 2. WEIGHT OF SAMPLE RECOMMENDED FOR INFRARED MOISTURE DETERMINATION

Sample	wt (g)
Crude palm oil	15.0
Palm kernel	5.0
Palm fibre	2.5

INVESTMENT

- Approximate RM 11 000 per unit.

CONCLUSION

Considerable time can be saved in moisture determination by using infrared moisture analyser as compared to conventional air heated oven. With the proper sample size and drying temperature, the time for moisture content

determination can be reduced from 4 hr to 15 min. The accuracy of the method is comparable to that by an air oven technique. For liquid sample such as CPO, this method is more environmental-friendly as compared to Karl-Fischer moisture determination method.

COMMERCIALIZATION

Using an Infrared Moisture Analyser to determine moisture content can save time, energy and makes the process control easy. It is recommended that palm oil mill should invest in an Infrared Moisture Analyser. With an investment of RM 11 000, the mill can achieve



Figure 1. IR Moisture Analyser.

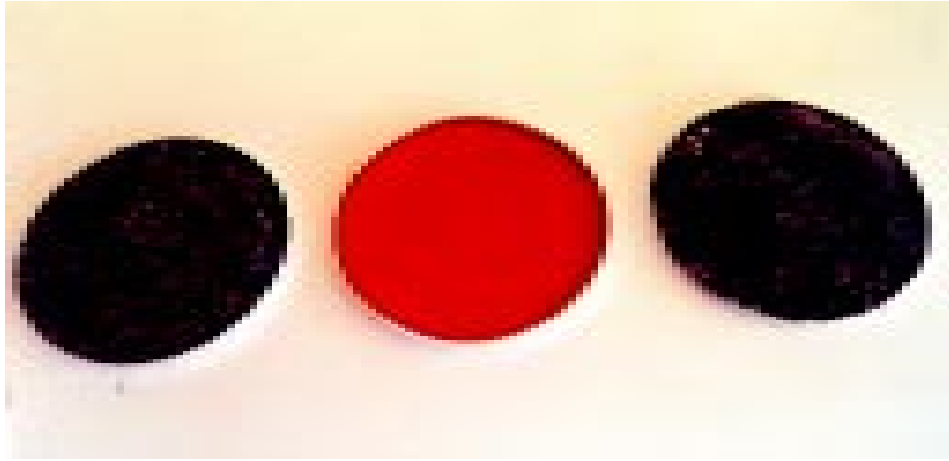


Figure 2. Left to right, palm kernel, production oil and press cake fibre.

better process control and increase productivity.

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