

Oleochem^{ir} Analyzer

For analysis of quality parameters in fats and oils



Introduction

Oils and fats are characterized principally by their state of unsaturation determined by Iodine value (IV) and %Trans content. The Oleochem^{ir} Analyzer comes pre-calibrated to measure these two key properties. Analysis of additional properties, not included in the basic analyzer configuration, can be provided on special request. Examples of other properties are Moisture content, Melting Point, Cloud Point, Saponification Number, Acid Value and Free Fatty Acid (FFA) content. It is also possible to provide oil degradation parameters such as Peroxide Value or Anisidine Value. Another common request is to develop a custom calibration for low IV in order to provide higher accuracy for specific products.

Calibrations Examples

These oil quality and degradation parameters require custom calibration methods specific to particular oil and fat types. Table 1 shows typical performance specifications for the parameters for fresh oil and Table 2, presents the results obtained for oil degradation parameters. For guaranteed performance specifications, it is necessary to evaluate the applications on a case-by-case basis.

Parameters	Range	SEP Uncertainty (1 sigma)	Repeatability (1 sigma)
Low IV	0 – 5	0.18	0.08
Moisture (%)	0 – 0.5	0.05	0.01
Melting Point (°C)	40 – 100	0.3 – 1.0	0.2
Cloud Point (°C)	8 – 14	0.6	0.2
Saponification Number	0 – 50	1.3	0.63
Acid Value (mgKOH/g)	187 – 270	0.53	0.11
	200 – 450	1.13	0.14
FFA (%)	0.01 – 0.1	0.03	0.01
	0.82 – 1.9	0.14	0.012
	1.6 – 4.4	0.1	0.02
α mono re-ester	2 – 30	1.3	0.3
	30 – 60	1.9	0.3
	0 – 15	0.3	0.05
	15 – 50	1.5	0.1
Free Glycerin	0.2 – 20	0.18	0.1

Table 1

Parameters	Range	SEP Uncertainty (1 sigma)	Repeatability (1 sigma)
Anisidine Value	0.34 – 200	18	4
Peroxide Value	0 – 14	0.9	0.2

Table 2

Calibration for Low IV

Applications for Oleochemical plants concerned with process optimization of final product are often required to measure an IV range at typically very low levels (below 2 IV). Figure 1 presents the excellent results achieved for fully hydrogenated palm oil (between 0 and 5 IV units) with an uncertainty (SEP) of 0.057 IV. This same calibration model transferred from one analyzer unit to another giving an SEP of 0.074 IV – i.e. the error of calibration transfer lies within the method repeatability (Table 1).

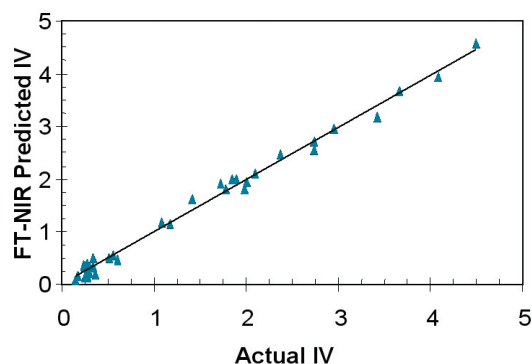


Figure 1

Calibration for Acid Value

Figure 2 shows the correlation plot for FT-NIR predicted acid value in palm oil. The calibration has been developed for a range between 200 and 450 AV giving a SEP of 1.13 and a repeatability of 0.14 (Table 1).

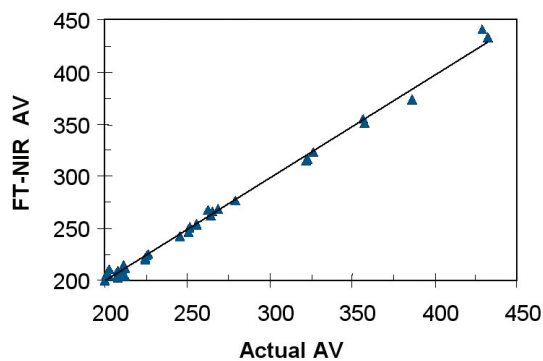


Figure 2

Calibration for Melting Point

Figure 3 presents a calibration curve developed on fish oil based on melting point parameter with a SEP of 0.43°C and a repeatability of 0.2°C.

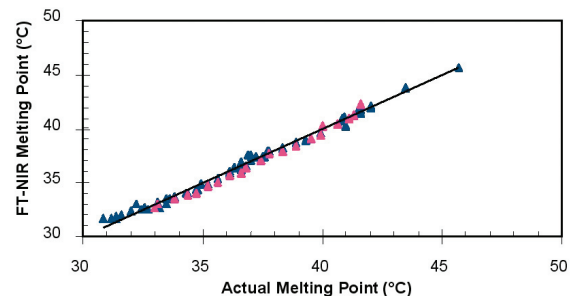


Figure 3

Calibration for Free Fatty Acid (FFA)

Figure 4 shows a correlation plot for the parameter free fatty acid (FFA) in cocoa butter. This calibration has been developed on a range between 0.8 and 3.3 FFA giving a SEP of 0.029 and a repeatability of 0.014.

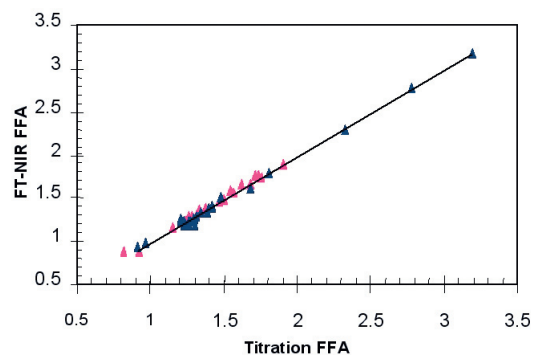


Figure 4

Conclusion

These few examples demonstrate the capability of the FTLA2000-CH10 Oleochemir Analyzer to generate useful QA data for oil quality and degradation parameters. These calibrations must be developed on a site-by-site basis for specific oil and fat products. ABB works in close partnership with customers to develop adapted solutions that meet their specific needs, offering a wide range of customer support services, including method development, in-house and on-site personnel training, as well as start-up and after-sales service.

