Determination of Fat Content in Infant Nutritional Formula

NMR

Food manufacturers everywhere want to control the quality and consistency of their products, and nowhere is this more important than in the production of infant nutritional formula. Fat content is a key nutritional and quality measure in infant formula, which must be carefully controlled. Oxford Instruments benchtop NMR does this quickly and easily, to high accuracy.

Method

NMR works by exciting and detecting a resonance signal from mobile protons in the sample. In food and agricultural materials, such protons are normally found in the water and/or fat in the sample.

Often the signals from water and fat interfere and cannot be separated, but if the water content is relatively low (as in this case) methods can be devised to distinguish between the signals. A calibration was set up using a 23MHz MARAN Ultra-23 with 18mm sample tubes. Repetition delay was 2 seconds using 8 scans – a total measuring time of approximately 16 seconds per sample, excluding weighing.

Samples in the as-received condition were simply loaded into tared sample tubes with a spatula, re-weighed and then placed in the instrument. The MARAN calibration and measurement routines offer the choice of manual or automatic weighing (via an RS232 connection to the MARAN PC). Manual weighing was used in this case, with sample weights typed into the calibration screen through the keyboard.

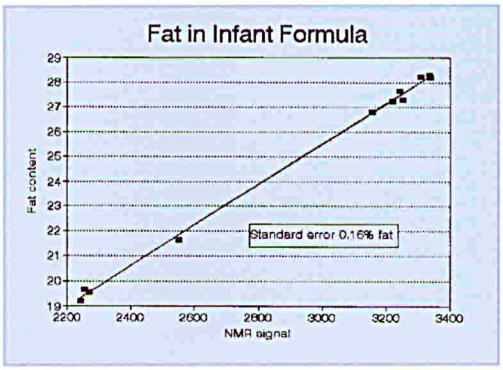
Calibration & Results

All but one of the samples fell into two distinct groups – one around 28-29% fat and one around 19-20% fat. The remaining sample fell between the two groups and fitted well with the calibration line between them. The resulting standard error of the calibration was 0.16% fat.

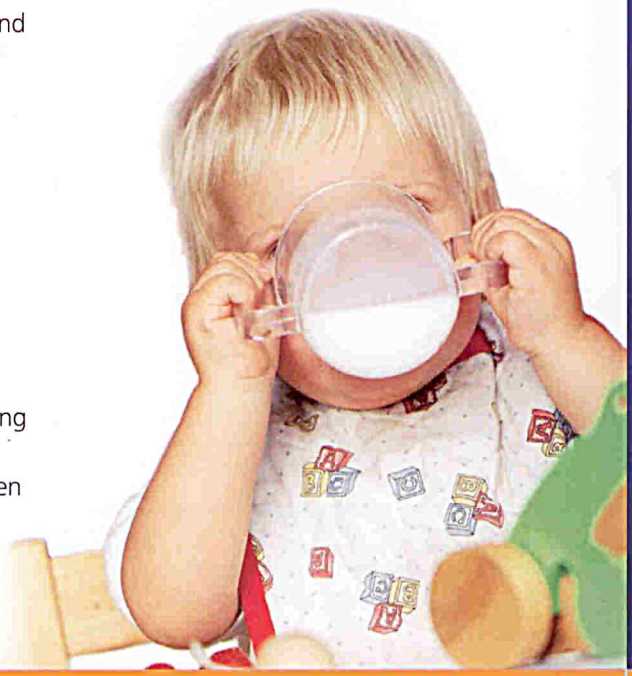
Recommended Instrument

The MARAN Ultra-23 fitted with an 18mm (7.5ml) sample probe is a suitable instrument for this application. Temperature conditioning blocks should also be ordered. It has numerous benefits include:

- PC based, with Windows control software
- Small benchtop footprint
- Simple, robust calibrations with easy maintenance
- Small calibration set (typically 6 samples)
- User-friendly operating software, with operator prompts
- Minimal sample preparation
- Fast, accurate measurements
- Multi-lingual capability



Calibration of fat content



Food & Agriculture

The MARAN Ultra-23 benchtop NMR system would be suitable for this application

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