

Mineral Oil is added to Crystal Polystyrene to increase its flexibility. Precise control of the amount of mineral oil used is necessary to ensure the correct performance properties are obtained reproducibly. NMR can provide a rapid and effective means of monitoring the mineral oil content in crystal polystyrene.

Method

NMR has a number of advantages over other techniques:

- NMR is very stable over the long term and rarely needs calibration adjustment.
- The measurement time is short (typically two seconds)
- The NMR technique is non-destructive, so the same sample may be measured several times before being analysed by other techniques.
- NMR is insensitive to air voids between polystyrene granules.
- Measurement precision is good compared to wet chemical methods.
- NMR does not require the use of hazardous solvents.
- Both weighing and non-weighing methods are available for this application

Calibration and Results

Five samples of crystal polystyrene were selected for the analysis of mineral oil content. Each sample was weighed into a tared 26mm glass tube and preconditioned for an hour at 105°C, before being placed in an **MQC+** for analysis.

The graph in Figure 1 illustrates the calibration of the NMR measurements against mineral oil contents determined by a reference method for these samples. The quality of the calibration exhibited in Figure 1 is excellent, as indicated by the correlation coefficient of 1 and the standard deviation of 0.07.

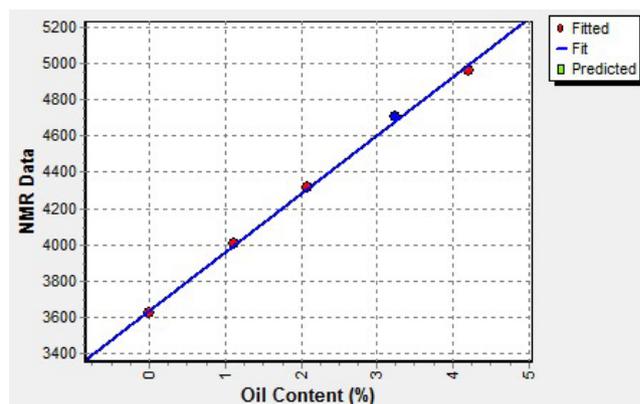


Figure 1: Calibration of NMR data and reference values for oil content. Correlation Coefficient: $r = 1$; Standard Deviation = 0.07.

Recommended Instrument

The **MQC+** with a 0.55 Tesla (23 MHz hydrogen resonance) magnet, fitted with a 26mm diameter (14ml sample) probe is a suitable instrument for this application. The Oil in Crystal Polystyrene package consists of:

- **MQC+** with a built-in computer operating Microsoft® Windows® 10 (no separate PC is required).
- **MultiQuant** software including **RI Calibration**, **RI Analysis**, and the **EasyCal** 'Oil in Crystal Polystyrene' application.
- 26mm glass tubes.
- User Manual.
- 'Oil in Crystal Polystyrene' method sheet.



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In addition to this package you will also require:

- A dry heater and aluminium block with 26mm holes for sample conditioning at 105°C.
- A precision balance.

The instrument offers multiple advantages over others on the market:

- High signal sensitivity.
- Small benchtop footprint.
- Low maintenance.
- Recyclable sample tubes, lowering consumable costs.
- Minimal sample preparation.

Note: Other instruments/packages are available for the analysis of larger or smaller sample quantities. Please contact Oxford Instruments for further details.



visit www.oxford-instruments.com/mqc for more information or email: magres@oxinst.com

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