

# Mineral Oil in Crystal Polystyrene

Mineral Oil is added to Crystal Polystyrene to increase its flexibility. This process requires a high degree of regulation, as the addition of too much mineral oil would dissolve the polystyrene polymer. 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:

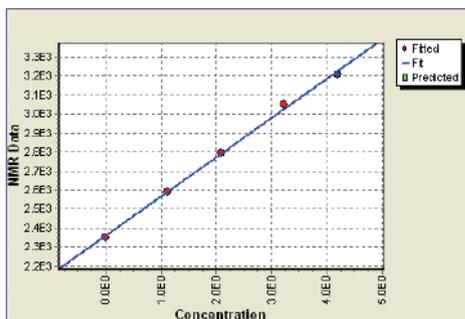
- It can be calibrated to cover a range from 0 to 100%.
- The measurement time is short (typically two seconds), allowing rapid sample throughput.
- The NMR technique is non-destructive, so polystyrene analysed is still usable.
- NMR is insensitive to air voids between polystyrene granules.
- NMR is very stable over the long-term, so calibrations will rarely require adjustment.
- NMR does not require the use of hazardous solvents.
- Both weighing and non-weighing methods are available for this application

## Calibration and Results

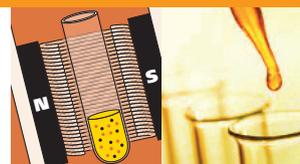
Five samples of crystal polystyrene were selected for the analysis of mineral oil content. Each sample was weighed into a tared 26mm glass tube and preconditioned for an hour at 105°C, before being placed in an **MQC-23** for analysis.

The graph in Figure 1 illustrates the calibration of the NMR measurements against mineral oil contents determined by an alternative 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.

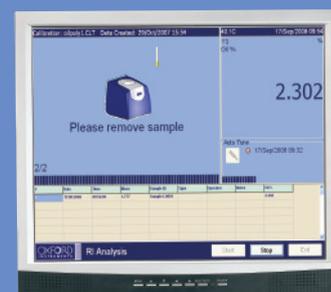


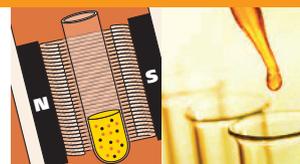
**Figure 1:** Calibration of NMR data and reference values for oil content.  
Correlation:  $r = 1$ ;  $SD = 0.07$ .



NMR

## Benchtop NMR for the Polymer Industry





## Recommended Instrument

The **MQC-23** fitted with a 26mm diameter probe is a suitable instrument for this application. The Oil in Crystal Polystyrene package comprises:

- **MQC-23** with a built-in computer operating the latest version of Microsoft® Windows® (no separate PC is required).
- MultiQuant software including RI Calibration, RI Analysis, and the EasyCal 'Oil in Crystal Polystyrene' application.
- 26mm glass tubes.
- Installation Manual.
- 'Oil in Crystal Polystyrene' method sheet.

### 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.**

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