Distributed by: PARKES SCIENTIFIC CANADA

The parent batch for this sample was manufactured, tested, packaged and stored on our behalf in accordance with the requirements of ISO 17025 and ISO 17034 by Paragon Scientific Ltd. The calibration certificate issued by Paragon Scientific Ltd for this product is reproduced below.

CERTIFICATE OF CALIBRATION

ISSUED BY PARAGON SCIENTIFIC LIMITED

Date of Issue: 31-Jan-23 **Certificate No.** SA4543

ilac-MRA UKAS REFERENCE MATERIALS 4589

Paragon Scientific Ltd

UKAS accredited calibration laboratory No.0649 accredited to ISO/IEC 17025
UKAS accredited reference material producer No.4589 accredited to ISO 17034
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Approved Signatory

Mr. P. Whitehurst
Technical Director

ISO 17025 / ISO 17034 VISCOSITY AND DENSITY REFERENCE STANDARD

Standard type: **VISC-WAT** Lot No: **3220204083** Expiration Date: **02-Aug-23**

Temperature (°C)	Temperature (°F)	Viscosity (mm^2/s) Kinematic	Viscosity (mPa·s) Dynamic	Density (g/mL)
5.00*	41.00*	1.5264	1.5263	0.99996
20.00	68.00	1.0034	1.0016	0.99819
25.00	77.00	0.89258	0.88991	0.99701
37.00	98.60	0.69585	0.69119	0.99330

Paragon Scientific Ltd certifies that the kinematic viscosity measurements have been made in accordance with ASTM D2162 using long capillary Master Viscometers at all temperatures unless marked with * which indicates measurements have been made to ASTM D445. See also ASTM D445, D446, D2171, ISO 3104, ISO 3105, IP 71 Sections 1 and 2 and IP 222. The viscosity data reported is based on the primary standard of pure water at 20 °C (ITS-90) having a value of 1.0034 mm^2/s (cSt) ± 0.17%, as adopted by NIST, ASTM, IP and ISO (ISO 3666). Density measurements were made in accordance with ASTM D1480. Temperature measurements were made using thermometers specified in ASTM D2162 which have a current calibration traceable to the National Physical Laboratory (NPL), National Institute Standards and Technology (NIST) and other recognised national standards laboratories. The calibrations of this product are traceable to NIST.

Viscosity, Expanded Uncertainties

ASTM D2162		
Viscosity Range	**Kinematic Viscosity, mm^2/s (cSt)**	**Dynamic Viscosity, mPa·s (cP)**
0.3 to 7.4	± 0.07 %	± 0.07 %
7.4 to 10	± 0.09 %	± 0.09 %
10 to 30	± 0.12 %	± 0.12 %

ASTM D445		
Viscosity Range	**Kinematic Viscosity, mm^2/s (cSt)**	**Dynamic Viscosity, mPa·s (cP)**
0.6 to 2	± 0.38 %	± 0.38 %
2 to 8	± 0.39 %	± 0.39 %
8 to 30	± 0.40 %	± 0.40 %

In certifying this standard Paragon Scientific Ltd used Analytical Reagent Grade water which was certified as delivered. The water was not distilled as per the requirements of ASTM D2162 Standard Practice for Basic Calibration of Master Viscometers and Viscosity Oil Standards, when certifying master viscometers. For this reason very slight discrepancies may be seen in the certified values when compared to the viscosity of 1.0034 mm^2/s (cSt), as listed for the primary standard of pure water at 20 °C. (Please see details above)

Uncertainties stated on this certificate do not include the uncertainty for the value of the viscosity of water at 20 °C (ITS-90) having a value of 1.0034 mm^2/s (cSt) ± 0.17%.

Density, Expanded Uncertainty: ± 0.01 %

The reported expanded uncertainties are based on a combined standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

The evaluation has been carried out in accordance with UKAS requirements.

Notes: The shelf life of this product is guaranteed until the expiry date, provided the bottle is unopened and stored at a temperature of less than 20 °C. Warning - Do not freeze!