


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	Intertek - MSG	
	Issue No: 017	Issue date: 14 January 2008
<p>C131 Wilton Centre Wilton Redcar Cleveland TS10 4RF</p>	<p>Contact: Mr Anthony Quinn Tel: +44 (0)1642-435779 Fax: +44 (0)1642-435777 E-Mail: anthony.quinn@intertek.com Website: www.measurementscience.co.uk</p>	
Testing performed at the above address only		

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for X-Ray Diffraction may typically include:</p> <p>Solid materials that can be formed or sampled as specimens, including:</p> <p>Polymers Composites Inorganic and Organic Chemicals Catalysts Environmental and Process Materials and Contaminants Formulations Foodstuffs Adhesives Pharmaceuticals Electronic Materials</p> <p>Liquids can also be examined, including:</p> <p>Suspensions Colloids Surfactants</p>	<p><u>Physical & Chemical Tests by X-Ray Diffraction</u></p> <p>X-Ray Diffraction patterns in reflection or transmission geometry.</p> <p>Phase identification from X-ray diffraction patterns using ICDD Powder Diffraction File database</p> <p>Polymer Crystallinity Index</p>	<p>Documented In-House Methods</p> <p>X-ray diffraction (XRD) based on</p> <p>BS EN 13925-1:2003 BS EN 13925-2:2003 BS EN 13925-3:2005</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for Inorganic Analysis may typically include:</p> <ul style="list-style-type: none"> Adhesives Catalysts Coatings Deposits Extracts Feedstocks Fibres Filled Materials Films Filters Food Contact Materials Foodstuffs Formulations Lubricants Metals Natural & Synthetic Polymers Oils Process Liquors Oxides Packaging Petrochemicals Pharmaceuticals Powders Processing Additives Raw Materials Residues Stabilisers Surfactants Supports Waste Streams 	<p><u>Chemical Tests by Inorganic Analysis</u></p> <p>Semi-Quantitative and Quantitative Elemental Analysis including:</p> <p>Catalyst Residues, Markers, Processing Additives, Stabilisers, Lubricants, Fillers, Poisons, Contamination, Trace Elements, Heavy metals, Corrosion</p> <p>CHN Analysis</p> <p>Carbon and Sulphur</p> <p>Trace Sulphur, Chlorine</p> <p>Trace Nitrogen</p> <p>Mercury Arsenic</p> <p>Loss on Ignition</p> <p>Halides, Sulphate & other Ions</p>	<p>In-House Methods using documented guidelines for single laboratory validation of methods of analysis using the techniques:</p> <p>Wavelength Dispersive X-Ray Fluorescence</p> <p>Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)</p> <p>Inductively Coupled Plasma Mass Spectroscopy (ICP-MS)</p> <p>Oxidative Combustion with Infra-Red/Thermal Conductivity Detection</p> <p>Oxidative Combustion with Infra-Red Detection</p> <p>Microcoulometry</p> <p>Chemiluminescence</p> <p>Pyrolysis with Atomic Absorption Spectrometry</p> <p>Cold Vapour Atomic Fluorescence Spectrometry</p> <p>Inductively Coupled Plasma Mass Spectroscopy</p> <p>Inductively Coupled Plasma Optical Emission Spectroscopy</p> <p>Hydride Generation Flame Atomic Fluorescence Spectrometry</p> <p>Gravimetric Analysis</p> <p>Ion Chromatography</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for Mechanical Testing may typically include:</p> <p>Adhesives Polymers Resins Composites/ Filled Materials Films Polymer Granules Wood Packaging</p>	<p><u>Mechanical Tests</u></p> <p>Static, oscillating and ramp measurement of strength, stiffness and toughness in tensile, compressive and flexural mode ranges. Sub-ambient to elevated temperatures, loads to 100 kN.</p> <p>Long Term Tests:</p> <p>Tensile Creep Testing 23°C to + 250°C.</p> <p>Creep Rupture (Static Fatigue) 23°C to +250°C.</p> <p>Environmental Creep Rupture (Static Fatigue) at 23°C</p> <p>Dynamic Fatigue in Tension -70°C to +250°C</p> <p>Impact – Charpy (Energy 1 to 22J) (Temperature range -70°C to +80°C)</p> <p>Impact - Izod (Energy 1 to 22J) (Temperature range -70°C to +80°C)</p> <p>Hardness – Rockwell (Scales L,M,R)</p> <p>Heat Distortion Temperature (HDT)</p>	<p>Documented In-House Methods</p> <p>Universal testing machines</p> <p>Creep Testing Equipment</p> <p>Creep Rupture Equipment</p> <p>Environmental Creep Rupture Equipment</p> <p>Pneumatic Fatigue Sites and Universal Testing Machines</p> <p>ISO 179:2001 ASTM D6110-06</p> <p>ISO 180:2001 ASTM D256-06a</p> <p>BS EN ISO 2039-2 ASTM D785-03</p> <p>ISO 75:2004</p>



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<p>ORGANIC CHEMICALS, POLYMERS, COMPOSITES , MONOMERS, SURFACTANTS, FORMULATIONS AND PROCESS RELATED MATERIALS</p> <p>Materials for NMR may typically include:</p> <p>Adhesives Cast Polymers Cured and Uncured Resins Films Polymer Shrink Packaging Heat seal Polymers PET Hot melt polymers Oil field chemicals Acrylics Polypropylene Polyethylene Polyamides Polyurethanes Polyesters Surfactants Lubricants Epoxides EO/PO copolymers Ethoxylates Propoxylates</p>	<p><u>Chemical Tests by Nuclear Magnetic Resonance</u></p> <p>Quantitative and Qualitative NMR to determine/identify:</p> <p>Impurities</p> <p>Composition both Molar and weight/weight</p> <p>Chemical Identification</p> <p>End Group Analysis</p> <p>Polymer Sequencing</p> <p>Tacticity</p> <p>Distribution of isomers</p> <p>Distribution of isomers</p> <p>Average Mn</p> <p>Deformulation</p> <p>Additive Analysis</p> <p>Chemical Identification</p> <p>Distribution of isomers</p> <p>Kinetic studies</p>	<p>Documented In-House Methods</p> <p>Nuclear Magnetic Resonance GPC/NMR, ¹H, ¹³C, DEPT 135. 45 and 90, 2D NMR typically, COSY, HMBC, HMQC, HETCOR, TOCSY, Multinuclear typically ³¹P, ¹⁹F, ¹¹B, ²⁷Al, ²⁹Si</p> <p>Using Spectrometers:</p> <p>JEOL Lambda 300 JEOL GSX 400 JEOL Eclipse 500</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for Surface Analysis may typically include:</p> <ul style="list-style-type: none"> Adhesives Biomaterials Cast Polymers Catalysts Ceramics Coated Materials Composites Cured and Uncured Resins Extruded Materials Fibres Filled Materials Films Foodstuffs Glass Laminated Materials Lubricants Medical Devices Metals Natural Products Packaging Materials Pharmaceutical Ingredients Plastics Polymers Polymer Additives Polymer Granules Powders Printed Materials Rubbers Semiconductors Surface Engineered Materials Surfactants 	<p><u>Chemical and Physical Tests by Surface Analysis</u></p> <p>Qualitative and Quantitative Analysis by XPS enabling measurement of:</p> <p>Identification of elements and chemistry present in the surface region</p> <p>Quantification of elements and chemistry present in the surface region</p> <p>Identification and Quantification of functional groups and oxidation states</p> <p>Adhesion 'Plane of Failure' analysis</p> <p>Mapping of surface elemental and chemical distribution</p> <p>Work Function</p> <p>Coating thickness</p> <p>Qualitative and Quantitative Analysis enabling measurement of:</p> <p>Identification of elements and molecular species present in the surface region</p> <p>Relative Quantification of molecular species present in the surface region</p> <p>Identification of functional groups</p> <p>Adhesion 'Plane of Failure' analysis</p>	<p>Documented In-House Methods</p> <p>X-Ray Photoelectron Spectroscopy (XPS)</p> <p>Electron Spectroscopy for Chemical Analysis (ESCA)</p> <p>XPS and Imaging XPS using the Kratos 'Axis Ultra' X-ray Photoelectron Spectrometer</p> <p>SOP/SA/27 ESCA calibration procedure for the Kratos 'Axis Ultra'</p> <p>SOP/SA/28 ESCA experimental procedure for the Kratos 'Axis Ultra'</p> <p>SAM/SA/1 The determination of surface elemental composition by ESCA</p> <p>Static Secondary Ion Mass Spectrometry (SSIMS), Imaging SSIMS, SIMS Depth Profiling (DSIMS) using the IonToF 'ToFSIMS IV' spectrometer</p> <p>SOP/SA/29 SIMS calibration procedure for the IonToF 'ToFSIMS IV'</p> <p>SOP/SA/30 SIMS experimental procedure for the IonToF 'ToFSIMS IV'</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for Thermal Analysis may typically include:</p> <ul style="list-style-type: none"> Adhesives Cast Polymers Ceramics Composites Cured and Uncured Resins Extruded Materials Filled Materials Films Foodstuffs Metals Plastics Polymer Granules Powders Rubbers Shrink Packaging Surfactants 	<p><u>Physical Tests by Thermal Analysis</u></p> <p>Quantitative analysis by DSC, enabling measurement of:</p> <ul style="list-style-type: none"> Crystallisation temperatures Degree of Crystallinity Enthalpy of fusion (Delta H) Enthalpy of re-crystallisation (Delta H) Glass transition temperatures (Tg) Melting points Phase transition temperatures Specific heat capacity (Cp) <p>Quantitative analysis by TMA, enabling measurement of:</p> <ul style="list-style-type: none"> Coefficient of linear thermal expansion (CLTE) Dimensional change with temperature or force variation Material anisotropy Softening point (penetration and indentation studies) 	<p>Documented In-House Methods</p> <p>Differential Scanning Calorimetry (DSC)</p> <p>Thermomechanical Analysis (TMA)</p>



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<p>AQUEOUS SOLUTIONS, ORGANO-METALLIC COMPLEXES, ORGANIC CHEMICALS, POLYMERS, COMPOSITES, MONOMERS, SURFACTANTS, FORMULATIONS AND PROCESS RELATED MATERIALS</p> <p>Materials for Mass Spectrometry may typically include:</p> <p>Adhesives Cast Polymers Cured and Uncured Resins Ethylene Vinyl Acetates Films Polymer Shrink Packaging Heat seal Polymers PET Hot melt polymers Oil field chemicals Acrylics Polypropylene Polybutadiene Polyethylene Polyamides Polyurethanes Polyesters</p> <p>Surfactants Lubricants Epoxides EO/PO copolymers Ethoxylates Propoxylates Vinyl Alcohol Vinyl Acetate</p>	<p><u>Chemical Tests by Mass Spectrometry</u></p> <p>Polymer end groups differentiation between cyclic and linear oligomers</p> <p>Average Mn Polydispersity</p> <p>Deformulation</p> <p>Chemical Identification of semi-volatile species</p> <p>Characterisation of cross-linked or insoluble polymers</p> <p>Characterisation of low level volatiles, undesirable impurities, identification of oligomeric species</p> <p>Quantification Additive /impurities /waste streams</p> <p>Evolved volatiles and thermal degradation characterisation of volatile components</p> <p>Characterisation of non-soluble polymers Identification and quantification of migratory species</p>	<p>Documented In-House Methods:</p> <p>Prerequisite Standard Operating Procedures (SOPS) Standard Analytical Methods (SAMS)</p> <p>Mass spectrometry using EI/CI/FD/FI/ESI/APCI Ionisation, liquid secondary ion MS.</p> <p>Gas Chromatography – Mass Spectrometry (GC/MS).</p> <p>Liquid Chromatography – Mass Spectrometry LC-MS/MS</p> <p>Pyrolysis - Mass Spectrometry.</p> <p>Matrix assisted laser desorption Ionisation time of flight mass spectrometry MALDI-TOF</p> <p>Tandem mass spectrometry (MS/MS)</p> <p>Gel-permeation Chromatography-mass spectrometry (GPC-MS)</p> <p>Thermal desorption (TD) GC-MS Head space GC-MS</p> <p>Gas chromatography-mass spectrometry (GC-MS)Pyrolysis GC-MS</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS, COMPOSITES AND PROCESS RELATED MATERIALS</p> <p>Materials for Chemical Analysis may typically include:</p> <p>Materials and articles in contact with foodstuffs – plastic:</p> <p>Acrylics (PMMA) Cellophane Cellulose Closures/sealing gaskets for polymers Components of paper and cardboard Ethylene vinyl acetate (EVA) Liquids Nylon Polymers Olefin Polymers Organic Compounds PEK Polymers PEK Polymers Perfluorocarbons (PTFE) Plastic Polymers Polyamide (PA) Polyetheretherketone(PEEK) Polyethylene (PE) Polyethylene phthalate (PET) Polypropylene (PP) Polystyrene (PS) Polysulfone (PES) Polyvinylchloride (PVC) Polymeric coatings on metal substrates, glass cloth, paper and paperboard Solids Textiles</p>	<p><u>Chemical Tests by Chemical Analysis</u></p> <p>European Overall and Specific Migration guide laying down the basic rules Directives, 82/711/EEC 85/572/EEC and 94/62/EC</p>	<p>Documented In-House Methods:</p> <p>European EN 1186-10 Overall Migration into olive oil (modified method where incomplete extraction of olive oil occurs)</p> <p>European EN 1186-11 Overall Migration into a mixtures of ¹⁴C – labelled synthetic triglyceride</p> <p>European EN 1186-12 Overall Migration at low temperatures</p> <p>European EN 1186-13 Overall Migration at high temperatures</p> <p>European EN 1186-14 'Substitute tests' for overall migration intended to come into contact with fatty foodstuffs using test media iso-octane and 95% ethanol.</p> <p>European EN 1186-14 'Substitute tests' for overall migration intended to come into contact with fatty foodstuffs using test media iso-octane and 95% ethanol.</p> <p>European EN 1186-15 Alternative test methods to migration in fatty food simulants by rapid extraction into iso-octane and 95% ethanol.</p> <p>European EN 13130-2 Determination of terphthalic acid in food simulants.</p> <p align="right">Continued....</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS AND AQUEOUS SUSPENSIONS, SURFACTANTS, TEXTILES</p> <p>Materials for Chemical Analysis may typically include:</p> <p>Surfactants</p> <p>Textiles</p> <p>Liquids: Water, Ethanol, Isopropanol</p> <p>Organic compounds</p> <p>Polymers Polymer Aqueous Suspensions</p> <p>Solids and Liquids</p>	<p><u>Chemical Tests</u> The determination of:</p> <p>Non volatile matter in liquid detergent formulations</p> <p>Soluble non volatile organic matter in liquid detergent formulations</p> <p>Soluble organic matter in solid detergent formulations</p> <p>Soluble nonionic matter in detergent formulations</p> <p>Peroxide content</p> <p>Cationic matter</p> <p>Anionic active matter</p> <p>Acid hydrolysable and non hydrolysable anionic matter</p> <p>The separation and recovery of anionic, cationic and nonionic matter from detergent formulations by ion exchange</p> <p>Anionic active matter</p> <p>Extractable material from textile samples by Soxhlet extraction</p> <p>Acidity/alkalinity in water, ethanol or isopropanol by colour indicator titration</p> <p>Water using a Metrohm 784 KFP Titrimo</p> <p>Acetone Insoluble Rubber in Acrylic Polymers</p> <p>Moisture in liquid and solid samples, using a Mitsubishi CA-06/VA-06 coulometric moisture</p>	<p>Documented In-House Methods:</p> <p>SAM/CHEM/1-</p> <p>SAM/CHEM/2 -</p> <p>SAM/CHEM/3 -</p> <p>SAM/CHEM/4-</p> <p>SAM/CHEM/7</p> <p>SAM/CHEM/8</p> <p>SAM/CHEM/9</p> <p>SAM/CHEM/10</p> <p>SAM/CHEM/12</p> <p>SAM/CHEM/16</p> <p>SAM/CHEM/5 -</p> <p>SAM/CHEM/6 -</p> <p>SAM/CHEM/11</p> <p>SAM/CHEM/19</p> <p>SAM/CHEM/20</p>



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<p>INORGANIC & ORGANIC CHEMICALS, POLYMERS AND AQUEOUS SUSPENSIONS</p> <p>Materials for Chemical Analysis may typically include:</p> <p>Polymers Polymer Aqueous Suspensions</p>	<p><u>Chemical Tests (continued)</u> The determination of:</p> <p>Ammonium perfluoro octanoate (APFO)</p> <p>Extractable materials from perfluorocarbon resins</p> <p>Identification of surfactants</p> <p>Non-volatile/total solids content</p>	<p>Documented In-House Methods:</p> <p>Solid phase extraction or solvent extraction (SAMCHEM/PAF/4, SAM/CHEM/PAF/7, SAM/CHEM/PAF/8, SAM/CHEM/PAF/9) followed by Chromatography</p> <p>SAM/CHEM/13 using Gravimetric analysis</p> <p>SAM/CHEM/PAF/3</p> <p>SAM/CHEM/PAF/1 using Gravimetric analysis</p>
END		