

Chemical analysis

Service list 2017

Wood, pulp and paper | Lignin samples
Liquids and liquors | Plastics and lacquer

March 2017



General conditions

SAMPLE PREPARATION

Unless otherwise stated, sample preparation is included in the price. If extra sample preparation is required, a quotation for this will be given prior to the analysis.

PRICES AND DISCOUNTS

For assignments, please contact respective contact person for an assignment plan and a quotation. For phone numbers and e-mail addresses, please see next page. For several analyses, discount offers are available for multiple samples.

DELIVERY TIMES

Delivery times are confirmed at the time of receipt of the order.

SAMPLE STORAGE AFTER TESTING

Residual test material will be discarded one month after the customer has received the final report. NOTE! Please indicate on the test instructions if the sample material is to be returned. The costs for this are charged to the customer.

ACCREDITED ANALYSES

INNVENTIA AB is accredited by SWEDAC in accordance with the requirements in ISO 17025. The accredited testing activity (Chemical analysis, Microbiological analysis and Physical testing) has the accreditation number 1771:02 and the accredited calibration activity (Optical Calibration Laboratory) has the accreditation number 1771:01. Accredited analyses are in the list indicated by * after the related standard/test method.

FULL CONFIDENTIALITY

The results of an assignment are the sole property of the client placing the order.

OTHER ANALYSES AND OTHER TYPES OF TESTS

Please call us to discuss analyses and types of tests other than those listed.

EXPLANATIONS OF METHOD DESIGNATIONS USED IN THE LIST

SCAN-C, SCAN-CM etc. refer to SCAN-test Methods. The designation ISO refers to an International Standard, SS-EN refers to a European Standard and SS to a Swedish



Standard. A preliminary EN-standard is designated prEN. The pulp and paper industry are nowadays recommended to use ISO Standards and/or EN Standards for properties related to quality control and thus used in trade.

ADMINISTRATIVE FEE

A basic administrative fee of SEK 700 is added per commission.

CONTACT

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WOOD, PULP AND PAPER

CARBOHYDRATES – WOOD, PULP AND PAPER METHOD

Chemical properties:

Acetyl group content	Ion chromatography
Carbohydrate (Ara, Gal, Glc, Man, Xyl) composition – acid hydrolysis method *	Ion chromatography [SCAN-CM 71]
Carbohydrate and uronic acid (Ara, Gal, Glc, Man, Xyl, 4OMe-ClcA, GalA, GlcA, HexA) composition – enzymatic hydrolysis method	Capillary electrophoresis
Carbohydrate and uronic acid (Ara, Gal, Glc, Man, Xyl, 4OMe-ClcA, GalA, GlcA, HexA) composition on fibre surfaces – enzymatic peeling method	Capillary electrophoresis
Starch content – enzymatic hydrolysis method	Ion chromatography [SCAN-P 91]

Macromolecular properties:

Alkali resistance (either R18, R10 or R8)	[ISO 699]
Alkali solubility (either S18, S10 or S8)	[ISO 692]
Alpha-, beta- and gamma-cellulose	[TAPPI T 203 cm]
Fock reactivity	Gravimetry
Cellulose molecular mass distribution (MMD) – tricarbaniation method	Size exclusion chromatography
Hemicellulose molecular mass distribution (MMD) – alkaline method	Size exclusion chromatography
Limiting viscosity	[ISO 5351]

More carbohydrate analyses are available. Please contact us for more information!

LIGNIN – WOOD, PULP AND PAPER	METHOD
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Kappa number	[ISO 302]
Lignin (Klason and acid-soluble) content – acid hydrolysis method	Gravimetry, UV/Vis-spectroscopy [TAPPI T 222 om, TAPPI UM 250]
Lignin molecular mass distribution (MMD)	Size exclusion chromatography

More lignin analyses are listed under "Lignin samples".

EXTRACTIVES – WOOD, PULP AND PAPER	METHOD
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Extractives (fatty acids, resin acids, sterols, lignans, steryl esters, triglycerids) composition – group separation method	Gas chromatography
Extractives (fatty acids, resin acids, sterols, alkanols, lignans, <i>etc.</i>) composition	Gas chromatography– mass spectrometry
Extractives molecular mass distribution	Size exclusion chromatography
Extract (acetone-soluble) content – SoxTec method	Gravimetry [SCAN-CM 49]
Extract (lipophilic) content – SoxTec method	Gravimetry [SCAN-CM 67]
Extract (chloroform-soluble) content – SoxTec method	Gravimetry [SCAN-CM 67]
Terpenes (mono-, di- and sesquiterpenes) content	Gas chromatography– mass spectrometry

OTHER ORGANIC COMPOUNDS – WOOD, PULP AND PAPER	METHOD
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Aldehyde (pentanal–nonanal) content	Headspace– gas chromatography– mass spectrometry
Alkylketenedimer (AKD) content	Gas chromatography– mass spectrometry
Anthraquinone (AQ) content	Gas chromatography– mass spectrometry
Carbon (total organic carbon, TOC) content	SSM-TOC analyzer
Chemical screening of organic constituents	Pyrolysis–gas chromatography–mass spectrometry
Chlorinated dioxins and furans (PCDD, PCDF) content	Gas chromatography– mass spectrometry
Hexanal content	Gas chromatography– mass spectrometry
Volatile organic compounds characterization	Headspace– gas chromatography– mass spectrometry

More organic analyses (ie. contents in extracts) are listed under "Product safety analysis".

ASH, METALS AND IONS – WOOD, PULP AND PAPER	METHOD
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Ash content – 525 °C or 900 °C ignition	Gravimetry [ISO 1762/2144]
Ash content (acid-insoluble)	Gravimetry [ISO 776]
Carbonate (inorganic carbon) content	SSM-TOC analyzer
Chloride (water extractable) content	Ion chromatography [ISO 9197]
Chlorine (total Cl) content – Schöniger combustion method	Ion chromatography [SCAN-CM 51 / ISO 11480]
Chlorine (organic Cl) content – Schöniger combustion method	Ion chromatography [SCAN-CM 52 / ISO 11480]
Chlorine (acetone extractable, EOX) content – Schöniger combustion method	Ion chromatography [SCAN-CM 55]
Mercury (Hg) content – HCl extraction method *	Flow injection mercury system [EN 71-3]
Mercury (Hg) content – hot/cold water extraction method *	Flow injection mercury system [EN 645/647, EN 12497]
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si, S, P) content – wet digestion method	Atomic emission spectroscopy
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si) content – ashing method	Atomic emission spectroscopy [SCAN-CM 38, SCAN-CM 63]
Metals (As, Ba, Cd, Cr, Pb, Sb, Se) content – HCl extraction method *	Atomic emission spectroscopy [EN 71-3]
Metals (As, Ba, Cd, Cr, Pb, Sb, Se) content – hot/cold water extraction method *	Atomic emission spectroscopy [EN 645/647, EN 12498]
Nitrite (water extractable) content	Ion chromatography



Sulfur (total S) content – Schöniger combustion method

Ion chromatography
[SCAN-CM 57]

Sulfur and phosphorus (total S and total P) content – wet digestion method

Atomic emission spectroscopy

Sulphate (water extractable) content

Ion chromatography
[ISO 9198]

PRODUCT SAFETY ANALYSIS (FOOD CONTACT ARTICLES, ETC.)	METHOD
– WOOD, PULP AND PAPER	

Overall migrations and extracts:

Dry matter content of aqueous extract	Gravimetry [EN 920 / FDA]
Heptane extract content	Gravimetry [BfR 3.2.1.6]
Heptane extract content	Gravimetry [FDA]
Overall migration to food simulant *	Gravimetry [EN 1186]
Sum migration to modified polyphenylene oxide (Tenax)	Gas chromatography– mass spectrometry [EN 14338]
Sum and specific migration to modified polyphenylene oxide (Tenax)	Gas chromatography– mass spectrometry

Specific migrations/extractions:

2-phenylphenol content	Gas chromatography– mass spectrometry
4-phenyl cyclohexene content	Gas chromatography– mass spectrometry
Azo dyestuffs content	Gas chromatography– mass spectrometry
Benzophenons (Michler’s ketone, DEAB, etc.) content	Gas chromatography– mass spectrometry
Chromium(VI) content	UV/Vis-spectroscopy
Colour fastness – migration to four migrants *	Visual determination [EN 646]
Diisopropylnaphtalenes (DIPN) content	Gas chromatography– mass spectrometry
Fluorescent whitening agents (FWA) fastness – migration to four migrants *	Visual determination [EN 648]
Fluorescent whitening agents (FWA) fastness – migration to four migrants	Liquid chromatography
Formaldehyde content – hot/cold water extraction method *	UV/Vis-spectroscopy [EN 1541]
Glyoxal content – hot/cold water extraction method	UV/Vis-spectroscopy [BfR 4.3.3.2]
Isothiazolines content	Gas chromatography– mass spectrometry
Mercury (Hg) content – HCl extraction method *	Flow injection mercury system [EN 71-3]
Metals (As, Ba, Cd, Cr, Pb, Sb, Se) content– HCl extraction method *	Atomic emission spectroscopy [EN 71-3]
Metals (As, Ba, Cd, Cr, Pb, Sb, Se) content– hot/cold water extraction method *	Atomic emission spectroscopy [EN 645/647, EN 12498]
Mineral oils (MOSH, MOAH)	Gas chromatography– mass spectrometry
Partially hydrated terphenyls (HTTP) content	Gas chromatography–

Pentachlorophenol (PCP) content	mass spectrometry Gas chromatography – high resolution mass spectrometry [EN 15320]
Phthalates content	Gas chromatography– mass spectrometry
Polyaromatic hydrocarbons (PAH) content	Gas chromatography– mass spectrometry
Primary aromatic amines (PAA) composition	Liquid chromatography– mass spectrometry [EN 13130-XX part B]
Primary aromatic amines (PAA) content	UV/Vis-spectroscopy [EN 13130-XX part A]
Polychlorinated biphenyls (PCB) content	Gas chromatography– high resolution mass spectrometry [ISO 15318]
 Microbiological analysis:	
Transfer of antimicrobial constituents Subcontracted laboratory	[EN 1104]
 Sensory analysis:	
Odour * Subcontracted laboratory	[EN 1230-1]
Off-flavour (taint) * Subcontracted laboratory	[EN 1230-2]

OTHER ANALYSES – WOOD, PULP AND PAPER	METHOD
Carbonyl content – Oxime derivatisation method	TN analyzer
Dry matter content	Gravimetry [ISO 638/287]
pH – hot or cold aqueous extract	[ISO 6588]
Fock reactivity	Gravimetry
Fiber saturation point	
Water retention value	
Moisture sorption	DVS
Total nitrogen content	TN analyzer

LIGNIN SAMPLES

LIGNIN, STRUCTURAL ELEMENTS & PHYSIOCHEMICAL PROPERTIES – LIGNIN SAMPLES	METHOD
Acidic groups content (carboxylic acid and sulphonic acid)	Conductometric titration [SCAN-CM 65]
Beta-ether linkages – thioacidolysis method	Q
Condensation degree – permanganate oxidation method	Gas chromatography
Decomposition temperature (T_d)	Thermogravimetry
Diffusion coefficient	Nuclear magnetic resonance
Elemental composition Subcontracted laboratory	
Glass transition temperature (T_g)	Differential scanning calorimetry
Hydroxyl groups (aliphatic, phenolic, carboxylic) content – NMR method	Nuclear magnetic resonance
Lignin (Klason and acid-soluble) content – acid hydrolysis method	Gravimetry, UV/Vis-spectroscopy [TAPPI T 222 om, TAPPI UM 250]
Lignin molecular mass distribution (MMD)	Size exclusion chromatography
Methoxyl content	Titration [TAPPI T 209 su]
Phenol content – The Folin-Ciocalteu method	UV/Vis-spectroscopy
Phenyl propane units	Pyrolysis– gas chromatography– mass spectrometry
Softening temperature (T_s)	Differential scanning calorimetry
Syringyl/guaiacyl ratio	Pyrolysis–GC/MS

CARBOHYDRATES – LIGNIN SAMPLES	METHOD
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Carbohydrate (Ara, Gal, Glc, Man, Xyl) composition – acid hydrolysis method *	Ion chromatography [SCAN-CM 71]
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Carbohydrate molecular mass distribution (MMD)	Size exclusion chromatography
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More carbohydrate analyses are available. Please contact us for more information!

EXTRACTIVES – LIGNIN SAMPLES	METHOD
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Extractives (fatty acids, resin acids, sterols, lignans, steryl esters, triglycerids) composition – group separation method	Gas chromatography
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Extractives molecular mass distribution	Size exclusion chromatography
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Extract (petroleum ether-extractable or hexane-extractable) content	Gravimetry
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Extract (acetone-soluble) content	Gravimetry [SCAN-CM 49]
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OTHER ORGANIC COMPOUNDS – LIGNIN SAMPLES	METHOD
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Carbon (total organic carbon, TOC) content	SSM-TOC analyzer
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Chemical screening of organic constituents	Pyrolysis– gas chromatography– mass spectrometry
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Volatile organic compounds characterization	Gas chromatography– mass spectrometry
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Total nitrogen content	
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ASH, METALS AND IONS – LIGNIN SAMPLES	METHOD
Ash content – 525 °C or 900 °C ignition	Gravimetry [ISO 1762/2144]
Carbonate (inorganic carbon) content	SSM-TOC analyzer
Chloride (water extractable) content	Ion chromatography [ISO 9197]
Chlorine (total Cl) content – Schöniger combustion method	Ion chromatography [SCAN-CM 51 / ISO 11480]
Chlorine (organic Cl) content – Schöniger combustion method	Ion chromatography [SCAN-CM 52 / ISO 11480]
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si) content – wet digestion method	Atomic emission spectroscopy
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si, S, P) content – wet digestion method	Atomic emission spectroscopy
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si) content – ashing method	Atomic emission spectroscopy [SCAN-CM 38, SCAN-CM 63]
Sulfur and phosphorus (total S and total P) content – wet digestion method	Atomic emission spectroscopy
Sulfur (total S) content – Schöniger combustion method	Ion chromatography [SCAN-CM 57]
Sulphate (water extractable) content	Ion chromatography [ISO 9198]
Dry matter content	Gravimetry [ISO 638/287]
Moisture sorption	DVS

LIQUIDS AND LIQUORS

CARBOHYDRATES – LIQUIDS AND LIQUORS	METHOD
Carbohydrate and uronic acid (Ara, Gal, Glc, Man, Xyl, 4OMe-ClcA, GalA, GlcA, HexA) composition – enzymatic hydrolysis method	Capillary electrophoresis
Carbohydrate and uronic acid (Ara, Gal, Glc, Man, Xyl, 4OMe-ClcA, GalA, GlcA, HexA) composition – without hydrolysis	Capillary electrophoresis
Carbohydrate (Ara, Gal, Glc, Man, Xyl) composition – acid hydrolysis method *	Ion chromatography [SCAN-CM 71]
Carbohydrate (Ara, Gal, Glc, Man, Xyl) composition – without hydrolysis	Ion chromatography [SCAN-CM 71]
Carbohydrate molecular mass distribution (MMD)	Size exclusion chromatography
Starch content – enzymatic hydrolysis method	Ion chromatography [SCAN-W 13]

More carbohydrate analyses are available. Please contact us for more information!

LIGNIN – LIQUIDS AND LIQUORS	METHOD
Lignin (Klason and acid-soluble) content – acid hydrolysis method	Gravimetry, UV/Vis-spectroscopy [TAPPI T 222 om, TAPPI UM 250]
Lignin molecular mass distribution (MMD)	Size exclusion chromatography
Lignin electrokinetic mobility distribution (MMD)	Size exclusion chromatography

More lignin analyses are listed under "Lignin samples".

EXTRACTIVES – LIQUIDS AND LIQUORS

METHOD

Extract (petroleum ether-extractable) content – Saltsman-Kuiken method	Gravimetry
Extractives (fatty acids, resin acids, sterols, alkanols, lignans, etc.) composition	Gas chromatography–mass spectrometry
Extractives (fatty acids, resin acids, sterols, lignans, steryl esters, triglycerids) composition – group separation method	Gas chromatography
Terpenes (mono-, di- and sesquiterpenes) content	Gas chromatography–mass spectrometry

OTHER ORGANIC COMPOUNDS – LIQUIDS AND LIQUORS	METHOD
Alkylketenedimer content (AKD) content	Gas chromatography–mass spectrometry
Anthraquinone (AQ) content	Gas chromatography–mass spectrometry
Carbon (total organic, TOC) content	TOC analyzer [EN 1484]
Chemical screening of organic constituents	Pyrolysis– gas chromatography– mass spectrometry
Chlorinated dioxin and furan content (PCDD, PCDF) content	Gas chromatography– mass spectrometry
Chlorophenols, chloroguaiacols and chlorocatechols content	Gas chromatography– mass spectrometry
Furfural and hydroxymethylfurfural content	Gas chromatography– mass spectrometry
Furfural and hydroxymethylfurfural content	Liquid chromatography
Pentachlorophenol (PCP) content	Gas chromatography – high resolution mass spectrometry [ISO 15320]
Phenolic compounds (unchlorinated) content	Gas chromatography– mass spectrometry
Polyaromatic hydrocarbons (PAH) content	Gas chromatography– mass spectrometry
Polychlorinated biphenyls (PCB) content	Gas chromatography– high resolution mass spectrometry [ISO 15218]
Volatile fatty acids and alcohols (acetic, propionic, iso-butyric, N-butyric, pentanoic and hexanoic acid) content	Gas chromatography– mass spectrometry
Volatile organic compounds characterization	Gas chromatography– mass spectrometry
Titrable acidity	[TAPPI T428 om]

ASH, METALS AND IONS – LIQUIDS AND LIQUORS	METHOD
Acetic acid content	Ion chromatography
Ash content – 525 °C or 900 °C ignition	Gravimetry [SCAN N-22, ISO 1762/2144]
Bromide content	Ion chromatography
Carbonate (total inorganic carbon) content	TOC analyzer
Chlorate content *	Ion chromatography [SCAN-W 10]
Chloride content	Ion chromatography
Fluoride content	Ion chromatography
Hydrogen sulfide content	Titration [SCAN-N 31]
Iodine content	Ion chromatography
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si, S, P) content – peroxide oxidation method	Atomic emission spectroscopy [SCAN-N 38]
Metals (Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, Si, S, P) content – wet digestion method	Atomic emission spectroscopy [SCAN-N 38]
Metals (As, Ba, Cd, Cr, Pb, Sb, Se) content	Atomic emission spectroscopy
Metals (K, Na) content – direct injection method	Atomic emission spectroscopy [SCAN-N 29]
Mercury (Hg) content	Flow injection mercury system
Monocarboxylic acids (acetic acid, fumatic acid, glycolic acid, lactic acid, oxalic acid) content	Ion chromatography
Nitrite content	Ion chromatography
Oxalate and calcium oxalate content	Ion chromatography

Oxalic acid content	Ion chromatography
Polysulphide content	Gas chromatography
Sulfur (total S) content – Schöniger combustion method	Ion chromatography [SCAN-N 35]
Sulfur and phosphorus (total S and total P) content – peroxide oxidation method	Atomic emission spectroscopy
Sulfur and phosphorus (total S and total P) content – wet digestion method	Atomic emission spectroscopy
Sulphate content	Ion chromatography [ISO 9198]
Sulphite content	Ion chromatography
Thiosulphate content	Ion chromatography

OTHER ANALYSES – LIQUIDS AND LIQUORS

METHOD

Adsorbable organically bound halogens (AOX) Subcontracted laboratory	[EN 1485]
Chelating agents (EDTA, DTPA) content Subcontracted laboratory	Gas chromatography
Dry matter content	Gravimetry [SCAN-N 22]
Endoglucanase activity	UV/Vis-spectroscopy
Fibre content	Gravimetry [SCAN-N 22]
Total nitrogen content	
Reduction degree	

WET END ANALYSIS – LIQUIDS AND LIQUORS

METHOD

Alkali (total, active and effective)	Potentiometric titration [SCAN-N 30]
Alkali (residual – hydroxide ion content)	Potentiometric titration [SCAN-N 30]
Basic chemical characterization of (pulp suspensions and) white waters	
Chemical oxygen demand (COD)	
Carbohydrate content – The Orchinol method	
	[SS/028122-2]
pH	
Water-soluble polymers molecular mass distribution (MMD)	Size exclusion chromatography

More wet end analyses are listed under “Wet end analysis – wood, pulp and paper”.

PLASTICS AND LACQUER

PRODUCT SAFETY (FOOD CONTACT ARTICLES, ETC.) – PLASTICS AND LACQUER

METHOD

Overall migrations to food simulants:

Overall migration to food simulant *	Gravimetry [EN 1186-3 / EN 1186-5 / EN 1186-9 / EN 1186-14]
Overall migration to food simulant (repeated use) *	Gravimetry [EN 1186-3 / EN 1186-5 / EN 1186-9 / EN 1186-14]
Overall migration to olive oil	Gas chromatography–mass spectrometry [EN 1186, EN 13130-1]
Sum migration to modified polyphenylene oxide (Tenax)	Gas chromatography–mass spectrometry [EN 14338]
Sum and specific migration to modified polyphenylene oxide (Tenax)	Gas chromatography–mass spectrometry

Specific migrations to food simulants:

1-octene and tetrahydrofuran	Liquid chromatography [EN 13130-26]
Acetic acid and vinyl ester	Liquid chromatography [EN 13130-9]
BADGE, BFDGE and their hydroxyl and chlorinated derivatives	Liquid chromatography [EN 15136]
Bisphenol A	Liquid chromatography [EN 13130-13, EN 14350]
Carpolactam and carpolactam salt	Liquid chromatography [EN 13130-16]
Epoxidized soy bean oil (ESBO)	Gas chromatography–mass spectrometry
Ethylenediamine and hexamethylenediamine	Liquid chromatography [EN 13130-21]
Ethylene glycol and diethyl glycol	Liquid chromatography [EN 13130-7]

Ethylene oxide and propylene oxide	Liquid chromatography [EN 13130-22]
Maleic acid and maleic anhydride	Liquid chromatography [EN 13130-24]
Metals (Ba, Co, Cu, Fe, Li, Mn, Zn)	Atomic emission spectroscopy
Mineral oils (MOSH, MOAH)	Gas chromatography–mass spectrometry
NOGE and its hydroxyl and chlorinated derivatives	Liquid chromatography [prEN 15137]
Primary aromatic amines (PAA) – composition	Liquid chromatography– mass spectrometry [EN 13130-XX part B]
Primary aromatic amines (PAA) – content	UV/Vis-spectroscopy [EN 13130-XX part A]
Terephthalic acid	Liquid chromatography [EN 13130-2]

SPECIAL ANALYSES – PLASTICS AND LACQUER
METHOD

Plasticizers and additives chemical characterization	Pyrolysis–gas chromatography– mass spectrometry
Polymer identification and chemical characterization	Pyrolysis–gas chromatography– mass spectrometry
Glass transition temperature (T_g)	Differential scanning calorimetry
Decomposition temperature (T_d)	Thermogravimetry



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