



MAPS

Malt Analytes Proficiency Testing Scheme

Scheme Description

LGC Standards

Proficiency Testing

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Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
2	11/11/08	Updated with UKAS logo for single scope (0001) and removed reference to scheme year. Appendix A updated for various parameters.	T.Noblett
3	Aug 2009	Operational issues common to all schemes moved into General Protocol. List of abbreviations added. New PORTAL system added Appendices updated for 2010 scheme year. New parameter added.	M.Whetton
4	Nov 2009	Sample size for mycotoxin materials altered.	M.Whetton
5	Dec 2009	Accreditation disclaimer removed for mycotoxin sample.	M.Whetton
6	Oct 2010	Appendix updated for 2011 scheme year.	M.Whetton
7	23/03/11	Change of address on Page 1	N.Stephenson
8	16/08/11	Details of inclusion of samples 4 and 5	M.Whetton
9	18/10/11	Appendix updated for 2012 scheme year.	M.Whetton
10	Sept 2012	Removed 'TRIAL' reference for samples 4 (black malt) and 5 (NDMA)	M. Whetton
11	Sept 2013	Details for sample 3 updated. Methods for FAN and EBC reject fraction updated for 2014.	W.Gaunt
12	Jan 2014	Assigned value text updated. Methods updated for various parameters for 2014.	W.Gaunt
13	Aug 2014	Methods updated for various parameters.	W.Gaunt
14	Sep 2014	SDPA updated for colour in sample 4. Inclusion of subcontracting information in 'Test Materials' section.	W.Gaunt
15	Sep 2015	Black and crystal malt separated (now 4A and 4B) Removed Hard copy report information.	W.Gaunt A.McCarthy
16	Sept 2016	Details updated for TSN (EBC & IOB) and EBC fermentability	W.Gaunt

Notes:

Where this document has been translated, the English version shall remain the definitive version

Scheme Aims and Organisation

The primary aim of the Malt Analytes Proficiency Testing Scheme (MAPS) is to enable laboratories performing the analysis of malt and barley to monitor their performance and compare it with that of their peers. MAPS also aims to provide information to participants on technical issues and methodologies relating to testing of malt and barley.

The MAPS scheme year operates from January to December. Further information about MAPS, including test material availability, round despatch dates and reporting deadlines, are available on the current MAPS application form.

Test Materials

Details of test materials available in MAPS are given in Appendix A. The test parameters are continually reviewed to ensure they meet the needs of current laboratory testing and regulatory requirements.

Test material batches are tested for homogeneity for at least one test parameter where deemed appropriate. Details of homogeneity tests performed and results are given in the MAPS Scheme Reports.

Some aspects of the scheme, such as test material production, homogeneity testing and stability assessment, can from time to time be subcontracted. When subcontracting occurs, it is placed with a competent subcontractor and LGC is responsible for this work. The planning of the scheme, the evaluation of performance and the authorisation of the final report will never be subcontracted.

Statistical Analysis

Information on the statistics used in MAPS can be found in the General Protocol and in the Scheme Report. Methods for determining assigned values and the values for SDPA used for individual samples are given in Appendix A

Methods

Methods are listed in PORTAL. Please select the most appropriate method from the list. If none of the methods are appropriate, then please report your method as 'Other' and record a brief description in the Comments Section in PORTAL.

Results and Reports

MAPS results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email. However, participants may request result submission forms on which to report and return results if they are unable to report through electronic means. This will incur an additional charge.

MAPS reports will be available on the website within 10 working days of round closure. Participants will be emailed a link to the report when it is available.

APPENDIX A - Description of abbreviations used

Assigned Value (AV) - The assigned value may be derived in the following ways:

- From the robust mean (RMean). This is the median of participant results after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. Generally, the assigned value will be set using results from all methods, unless the measurement is considered method-dependant, in which case the assigned value will be set by method as illustrated in the report tables.

For some analytes, where there is a recognised reference method for that type of measurement, this may be used as the assigned value for a particular analyte i.e. it would be applied to results obtained by any method.

Traceability: Assigned values which are derived from the participant results, or a sub-set of the results are not traceable to an international measurement standard. The uncertainty of assigned values derived in this way is estimated from the participant results, according to ISO 13528.

- From a formulation value (Formulation). This denotes the use of an assigned value derived from sample preparation details, where known and exact quantities of analyte have been used to prepare the sample.

Traceability: Assigned values calculated from the formulation of the test sample are traceable, via an unbroken metrological traceability chain, to an international measurement standard. The measurement uncertainty of the assigned value is calculated using the contributions from each calibration in the traceability chain.

- From a qualitative formulation (Qual Form). This applies to qualitative tests where the assigned value is simply based on the presence/absence of the analyte in the test material.

Traceability: Assigned values calculated from the qualitative formulation of the test sample are traceable to a certified reference standard or a microbiological reference strain.

- From expert labs (Expert). The assigned value for the analyte is provided by an 'expert' laboratory.

Traceability: Assigned values provided by an 'expert' laboratory may be traceable to an international measurement standard, according to the laboratory and the method used. The uncertainty of measurement for an assigned value produced in this way will be provided by the laboratory undertaking the analysis. Details of traceability and the associated uncertainty will be provided in the report for the scheme/round.

Range

This indicates the concentration range at which the analyte may be present in the test material.

SDPA

SDPA represents the 'standard deviation for proficiency assessment' which is used to assess participant performance for the measurement of each analyte. This may be a fixed value (as stated), a percentage (%) of the assigned value or based on the robust standard deviation of the participant measurement results, either across all methods or by method depending on whether the measurement made is method dependent (see assigned value).

Units

This indicates the units used for the assessment of data. These are the units in which participants should report their results. For some analytes in some schemes participants may have a choice of which units to report their results, however, the units stipulated in this scheme description are the default units to which any results reported using allowable alternative results will be converted to.

DP

This indicates the number of decimal places to which participants should report their measurement results.

Sample 1: Brewers and Distiller malt for chemical analysis

Participants will receive 2 x 1000ml pots of malt

1) Malt sample - Malt dependent tests

Analyte	Method	Range	AV	SDPA	Units	DP
Moisture	Oven Method	All	RMean	0.15	% w/w	1
DPWK (Diastatic power)	Iodometric (reference method)	≤350	RMean (Iodometric)	20	WK units, dry basis	0
	Segmented flow (e.g. Skalar)	350-500		25		
	Calculated value (from IOB)	>500		30		
Diastatic Power (DP IoB)	Fehling's	≤91	Calculated value	9.1	IoB, as is basis	0
	Ferricyanide	91-128		10.4		
	Segmented flow (e.g. Skalar)	>128		11.6		
	Calculated value (from DPWK)					
Alpha Amylase	International method – automated segmented flow (e.g. Skalar)	≤60	RMean	5.5 Robust SD	DU, dry basis	0
	International method – manual	>60				
Total Nitrogen	Dumas	All	RMean	0.028	%, dry basis	2
	Kjeldahl	All	RMean	0.028	%, dry basis	2
	NIR	All	RMean (Dumas)	0.04	%, dry basis	2
Friability	Friability meter	All	Expert	1.7	%	1
Homogeneity	Friability meter	All	RMean	0.5	%	1
Glassy (Whole) Corns	Friability meter	All	RMean	0.4	%	1
Partly Unmodified Grains	Friability meter	All	RMean	0.52	%	1
Sieving Test <2.20mm	Steinecker/Glasblaserei Sortimat	All	RMean (Steinecker)	0.3	%	1
Sieving Test 2.20 to 2.50mm	Steinecker/Glasblaserei (EBC Fraction III) Sortimat	All	RMean (Steinecker)	0.5	%	1
Sieving Test 2.50 to 2.80mm	Steinecker/Glasblaserei (EBC Fraction II) Sortimat	All	RMean (Steinecker)	1.5	%	1
Sieving Test >2.80mm	Steinecker/Glasblaserei (EBC Fraction I)	All	RMean (Steinecker)	1.8	%	1

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Analyte	Method	Range	AV	SDPA	Units	DP
EBC Reject Fraction (EBC Fraction IV plus foreign matter)	Analytica EBC	All	RMean	0.5	%	1
EBC Fraction IV (<2.2mm + damaged corns from all other sieves)	Analytica EBC	All	RMean	0.5	%	1
Malt Modification	Image analyser Visual	All	RMean (all methods)	1.6	%	1
Malt Mod Homogeneity	Image analyser Visual	All	RMean (all methods)	8	%	1
DMSP (Malt) (Dimethyl Sulfide Precursor)	GC-FPD GC-FID	≤8 >8	RMean	0.6 1.2	mg/kg, as is basis	1
Free DMS (Malt) (Dimethyl Sulfide)	GC-FPD GC-FID	≤8 >8	RMean	1.0 Robust SD	mg/kg, as is basis	1
Total DMS (Malt) (Dimethyl Sulfide)	GC-FPD GC-FID	≤10 >10	RMean	1.2 Robust SD	mg/kg, as is basis	1
DMSP EBC Wort (Dimethyl Sulphide Precursor)	GC-FPD GC-FID	≤10 >10	RMean	0.5 Robust SD	mg/kg, as is basis	1
Residual Sulfur Dioxide	GC, Monier Williams Para Rosaniline, DTNB, Ripper, Enzymatic	≤10 >10	RMean	1 2	mg/kg, as is basis	1
Cold Water Extract	Cold water extract	All	RMean	0.5	% (m/m), as is basis	1
Hartong VZ45	VZ45	All	RMean	1.5	%, dry basis	1
NDMA (Nitrosodimethylamine)	GC-TEA GC-MS	≤ 2.5 > 2.5	RMean	0.5 1.0	µg/kg, as is basis	1
Glycosidic Nitrile	Distillation	All	RMean	0.11	g CN/tonne, as is basis	1
Total Phenols	Chromatographic methods Colorimetric	All	RMean (all methods)	Robust SD	mg/kg, as is basis	1

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2) Malt sample - EBC wort dependent tests

Analyte	Method	Range	AV	SDPA	Units	DP
Extract: 1.0mm	Paddle stirrer /Density Meter, Magnetic stirrer/Density Meter	All	RMean	0.4	%, dry basis	1
Extract: 0.2mm	Paddle stirrer /Density Meter, Magnetic stirrer/Density Meter	All	RMean	0.4	%, dry basis	1
EBC Extract Difference (0.2-1.0)	Calculation	All	RMean	0.3	%, dry basis	1
pH (EBC Wort)	pH meter	All	RMean	0.05	Units	2
Colour (EBC Wort)	Visual	≤6 >6	RMean	0.3 Robust SD	deg EBC	1
	Spectrophotometric	≤6 >6	RMean	0.4 Robust SD	deg EBC	1
Boiled Wort Colour (EBC Wort)	Visual – heating plate Visual – oil bath	≤9 >9	RMean	0.8 Robust SD	deg EBC	1
	Spectrophotometer – heating plate Spectrophotometer – oil bath	≤9 >9	RMean	0.8 Robust SD	deg EBC	1
TSN (EBC Wort) (Total Soluble Nitrogen)	Dumas	All	RMean	0.025	% (m/m), dry basis	2
	Kjeldahl	All	RMean	0.025	% (m/m), dry basis	2
	Spectrophotometric	All	RMean (Kjeldahl)	0.025	% (m/m), dry basis	2
Kolbach Index	Dumas	All	RMean	1.4	%	1
	Kjeldahl	All	RMean	1.4	%	1
FAN (Free Alpha Amino Nitrogen)	Manual Ninhydrin method Automated Ninhydrin method (e.g. Skalar) Automated other (e.g. Beermaster)	All	RMean	9	mg/L	0
Viscosity (EBC Wort)	Falling Ball Viscometer, Rotary Viscometer, Glass Capillary Viscometer	All	RMean	0.02	mPas	2
EBC Fermentability (Boiled)	Dried yeast/Density meter Fresh (brewers/distillers) Yeast/ Density meter Fresh (bakers) Yeast/ Density meter	All	RMean (Fresh brewers/distille rs yeast)	1.4	%	1
Beta Glucan (EBC Wort)	Spectrophotometric	All	RMean	20	mg/L	0
	Fluorimetric	All	RMean	20	mg/L	0

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Analyte	Method	Range	AV	SDPA	Units	DP
	Enzymatic	All	RMean	20	mg/L	0

3) Malt sample - loB wort dependent tests

Analyte	Method	Range	AV	SDPA	Units	DP
loB Extract 0.7mm	Paddle stirrer /Density Meter, Magnetic stirrer/Density Meter Manual stir/Density Meter	All	RMean	1.5	L deg/Kg, dry basis	1
loB Extract 0.2mm	Paddle stirrer /Density Meter, Magnetic stirrer/Density Meter Manual stir/Density Meter	All	RMean	1.5	L deg/Kg, dry basis	1
loB Extract Difference (0.2-0.7)	Calculation	All	RMean	1	L deg/Kg, dry basis	1
loB Soluble Extract 1.0mm	Calculation	All	RMean	0.3	% sol ext, as is	1
loB Soluble Extract 0.7mm	Calculation	All	RMean	0.3	% sol ext, as is	1
loB Soluble Extract 0.2mm	Calculation	All	RMean	0.3	% sol ext, as is	1
loB Sol Extract Difference (0.2-0.7)	Calculation	All	RMean	0.3	% sol ext, as is	1
loB Sol Extract Difference (0.2-1.0)	Calculation	All	RMean	0.35	% sol ext, as is	1
pH (loB Wort)	pH meter	All	RMean	0.05	pH units	2
Colour (loB Wort)	Visual	≤6 >6	RMean	0.3 Robust SD	deg EBC	1
	Spectrophotometric	≤6 >6	RMean	0.4 Robust SD	deg EBC	1
TSN (loB Wort) (Total Soluble Nitrogen)	Dumas	All	RMean	0.025	% (m/m), dry basis	2
	Kjeldahl	All	RMean	0.025	% (m/m), dry basis	2
	Spectrophotometric	All	RMean (Kjeldahl)	0.025	% (m/m), dry basis	2
SNR (Soluble Nitrogen Ratio)	Dumas	All	RMean	1.5	%	1
	Kjeldahl	All	RMean	1.5	%	1
FAN (loB Wort) (Free Alpha Amino Nitrogen)	Manual Ninhydrin method Automated Ninhydrin method (e.g. Skalar) Automated other (e.g. Beermaster)	All	RMean	8	mg/L	0

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Analyte	Method	Range	AV	SDPA	Units	DP
Viscosity (IoB Wort)	Falling Ball Viscometer, Rotary Viscometer, Glass Capillary Viscometer	All	RMean	0.03	mPas	2
IoB Fermentability (Unboiled 0.7mm)	Dried yeast/Density meter Fresh (brewers/distillers) Yeast/ Density meter Fresh (bakers) Yeast/ Density meter	All	RMean	0.5	%	1
Fermentability (Unboiled 0.2mm)	Dried yeast/Density meter Fresh (brewers/distillers) Yeast/ Density meter Fresh (bakers) Yeast/ Density meter	All	RMean	0.5	%	1
IoB Fermentability (<i>Boiled</i>)	Real attenuation Dried yeast/Density meter Fresh (brewers/distillers) Yeast/ Density meter Fresh (bakers) Yeast/ Density meter	All	RMean	1.0	%	1
Predicted Spirit Yield (as is)	NIR Calculation from fermentability	All	RMean	3	L alcohol/tonne, as is	0
Beta Glucan (IoB Wort)	Spectrophotometric	All	RMean	10	mg/L	0
	Fluorimetric	All	RMean	10	mg/L	0
	Enzymatic	All	RMean	10	mg/L	0

Sample 2: Barley

Barley for chemical analysis

Participants will receive

1 x 1000ml pot of barley.

Analyte	Method	Range	AV	SDPA	Units	DP
Moisture	Oven (<i>ISO Method</i>)	All	RMean (ISO oven)	0.2	% w/w	1
	Moisture meter			0.3		
	NIR (<i>Near Infrared</i>)			0.2		
Total Nitrogen	Dumas	All	RMean	0.03	%, dry basis	2
	Kjeldahl		RMean	0.03	%, dry basis	2

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Analyte	Method	Range	AV	SDPA	Units	DP
	NIR (<i>Near Infrared</i>)		RMean (Dumas)	0.03	%, dry basis	2
Sieving Test <2.20mm	Steinecker/Glasblaserei	All	RMean (Steinecker)	0.3	%	1
	Sortimat					
	Other					
Sieving Test <2.25mm	Steinecker/Glasblaserei	All	RMean (Steinecker)	0.3	%	1
	Sortimat					
	Other					
Sieving Test 2.20 to 2.50mm	Steinecker/Glasblaserei (<i>EBC Fraction III</i>)	All	RMean (Steinecker)	1	%	1
	Sortimat					
	Other					
Sieving Test 2.25 to 2.50mm	Steinecker/Glasblaserei	All	RMean (Steinecker)	1	%	1
	Sortimat					
	Other					
Sieving Test >2.50mm	Steinecker/Glasblaserei	All	RMean (Steinecker)	1.5	%	1
	Sortimat					
	Other					
Sieving Test 2.50 to 2.80mm	Steinecker/Glasblaserei (<i>EBC Fraction II</i>)	All	RMean (Steinecker)	3	%	1
	Sortimat					
	Other					
Sieving Test >2.80mm	Steinecker/Glasblaserei (<i>EBC Fraction I</i>)	All	RMean (Steinecker)	3.5	%	1
	Sortimat					
	Other					
EBC Reject Fraction (<i>EBC Fraction IV plus Foreign Matter</i>)	Analytica EBC	All	RMean	0.5	%	1
EBC Fraction IV (<i><2.2mm + damaged corns from all other sieves</i>)	Analytica EBC	All	RMean	0.5	%	1
Thousand Corn Weight	EBC 3.4 (Automatic corn counter)	All	RMean	0.6	g, dry basis	1
	EBC 3.4 (Manual corn counter)					
Germinative capacity	Rapid (<i>TET_M</i>) staining	All	RMean	1.5	%	0

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Analyte	Method	Range	AV	SDPA	Units	DP
	Peroxide	All	RMean	1.5	%	0
Germinative energy	Aubry 5 day test	All	RMean	1	%	0
	Schonfeld 5 day test	All	RMean	1	%	0
	BRF 4ml Test (72hrs)	All	RMean	1.5	%	0
	BRF 8ml Test	72hrs	≤90 >90	RMean	10 5	%
Hectolitre Weight	Chondrometer NIR	All	RMean	0.7	Kg/hectolitre	1

Sample 3: Mycotoxin

Malt flour for mycotoxin analysis

Participants will receive

2 x 100g pots of malt flour (sample and blank*)

Analyte	Method	Range	AV	SDPA	Units	DP
Ochratoxin A	ELISA Lateral flow (e.g. Charm, Neogen) HPLC	All	RMean	25% of AV	µg/kg	1
Deoxynivalenol (DON)	ELISA Lateral flow (e.g. Charm, Neogen) HPLC	All	RMean	25% of AV	µg/kg	0

*Blank material supplied as a quality control material only (results are not required to be returned for this material).

Sample 4A: Black malt

Specialised malt for chemical analysis

Participants will receive

1 x 300ml pot

Analyte	Method	Range	AV	SDPA	Units	DP
Moisture	Oven Moisture meter	All	RMean	0.15	% w/w	2

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Analyte	Method	Range	AV	SDPA	Units	DP
Colour	EBC 5.6, Vis Col, 450g mixed mash EBC 5.10 / IoB 3.6, Vis Col, 450g boiled mash IoB 3.2.4, Vis Col, 515ml boiled mash EBC 5.6, 430nm Spec Col, 450g mixed mash EBC 5.10 / IoB 3.6, 430nm Spec Col, 450g boiled mash IoB 3.2.4, 430nm Spec Col, 515ml boiled mash	All	RMean	Robust SD	deg EBC	1

Sample 4B: Crystal malt

Specialised malt for chemical analysis

Participants will receive

1 x 300ml pot

Analyte	Method	Range	AV	SDPA	Units	DP
Moisture	Oven Moisture meter	All	RMean	0.15	% w/w	2
Colour	515ml Spec Wort Colour, (IoB 3.3, 2 hour extraction @ 65°C, 50/50 mixed mash) 515ml Visual Wort Colour (IoB 3.3, 2 hour extraction @ 65°C, 50/50 mixed mash) 450g Spec Wort Colour (IoB 3.3 / EBC 5.7, 2 hour extraction @ 65°C, 50/50 mixed mash) 450g Visual Wort Colour (IoB 3.3 / EBC 5.7, 2 hour extraction @ 65°C, 50/50 mixed mash) 450g Spec Wort Colour (EBC 5.5, 45 – 70°C extraction, 50/50 mixed mash) 450g Visual Wort Colour (EBC 5.5, 45 – 70°C extraction, 50/50 mixed mash)	All	RMean	Robust SD	deg EBC	1
Degrees of crystallisation	Visual	All	RMean	Robust SD	%	1

Sample 5: NDMA

Malt flour for NDMA analysis

Participants will receive

1 x 200g flour based matrix

Analyte	Method	Range	AV	SDPA	Units	DP
NDMA <i>(Nitrosodimethylamine)</i>	GC-TEA GC-MS	≤ 2.5 > 2.5	RMean	0.5 1.0	µg/kg, as is basis	1

Text written in italics is for reference purposes only and will not feature in the published report.