BAPS

Brewing Analytes Proficiency Testing Scheme

Scheme Description

LGC Standards
Proficiency Testing
1 Chamberhall Business Park
Chamberhall Green
Bury, BL9 0AP
UK.

Telephone: +44 (0) 161 762 2500
Fax: +44 (0) 161 762 2501
Email: baps@lgcgroup.com
Website www.lgcstandards.com

LGC is the accredited PT provider of this scheme

Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
2	01/09/08	Updated with UKAS logo for single scope (0001) and removed reference to scheme year.	T.Noblett
3	11/11/08	Appendix A updated for various parameters. Document reviewed for 2009 & updated.	T.Noblett
4	12/05/09	Changed logo from BRi to Campden BRI	T.Noblett
5	02/10/09	Operational issues common to all schemes moved into General Protocol. List of abbreviations added. New PORTAL system added Appendices updated for 2010 scheme year. Bitter/ales separated into individual categories. New parameters added.	M.Whetton
6	22/02/10	Various parameter names and SDPA values updated for 2010.	M.Whetton
7	Sept 2010	Various parameter names and SDPA values updated for 2011. New format for micro reporting.	M.Whetton
8	Jan 2011	New attributes included for 2011 sensory testing. Address changed.	M.Whetton
9	Aug 2011	Structures amended for HRV (foam) and CO2. SDPA's amended for certain parameters.	M.Whetton
10	Sept 2012	New samples added for brewing liquor (6A) & effluent simulant solution (6B). Two methods added to foam stability.	M.Whetton
11	Sept 2013	Included microbiological methods and codes, decimal places amended for various analytes. 'Trial' reference removed from samples 6A & 6B.	T.Noblett M.Whetton
12	Jan 2014	Method updates in appendices.	W.Gaunt
13	Aug 2014	Method updates in appendices.	W.Gaunt
14	Sept 2014	Sample 7 Alcohol free/low alcohol beer added for 2015. Inclusion of subcontracting information in 'Test Materials' section.	W.Gaunt
15	Sept 2015	Removed Hard copy report information Sample 6 removed. ABV added to sample 3	A.McCarthy W.Gaunt
16	October 2015	Additional information added for sensory testing	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 Brewing Analytes Proficiency Testing Scheme (BAPS) is to enable laboratories performing the analysis of beer to monitor their performance and compare it with that of their peers. BAPS also aims to provide information to participants on technical issues and methodologies relating to testing of beer.

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

Test Materials

Details of test materials available in BAPS 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 BAPS 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 BAPS 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.

Sensory Testing

Scoring is based on a 0 to 9 scale where 0 = absent, 1 = detected and 9 = intense.

Each attribute is to be scored using against the 0 – 9 scale.

The quantification of key flavours and aromas in beer will be compared with other tasters and taste panels and against a reference value determined by the sensory panel at Campden BRI

The following qualitative comparisons will also be provided for each available attribute based on the scores provided by participants.

- % Agreement within panel
- % Agreement with all tasters
- % Agreement with Campden BRI
-

Full details of the qualitative and quantitative assessments provided are described in the Sensory reports.

Methods

Methods are listed in Appendix A and 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.

Abbreviations for microbiological method codes can be found in Appendix A. The time and temperature of incubation does not need to be reported.

Results and Reports

BAPS 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.

The reports for these test materials will be available on the website within 10 working days of round closure.

The results for BAPS sample 5 are submitted using report proformas. The reports for these test materials will be issued via email within 15 working days of round closure.

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 - The concentration range at which the analyte may be present in the test material.

SDPA – The 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 and 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.

ABBREVIATIONS FOR MICROBIOLOGICAL METHODS

MF = Membrane filtration
SP = Spread plate
WLD = Wallerstein differential agar
WLN = Wallerstein nutrient agar

All analytes will also have 'OTHER' as a method choice in case your method is not listed

Samples 1L and 1B: **Lager/Ale (Bitter) for Chemical Analysis**
Supplied as: Four canned or bottled products (440mL or greater)

Analyte	Method	Range	AV	SDPA	Units	DP
Alcohol by Volume	All	2-6%	RMean	0.05	% ABV	2
Original Gravity	All	1030-1050	RMean	0.30	°Sacc	2 (10xx.xx)
Original Extract	All	All	RMean	0.10	°Plato	2
Present Gravity	All	All	RMean	0.15	°Sacc	2 (10xx.xx)
Apparent Gravity *(Present Gravity)*	All	All	RMean	0.03	°Plato	2
Bitterness (factor = 50)	Extract/ Spectrophotometer	≤20 >20	RMean	1.0 1.3	BU	1
Colour @ 430 nm	Spectrophotometer Colorimeter Other	≤20 >20	RMean	0.3 1.0	EBC	1
pH	pH Meter	All	RMean	0.05	pH Units	2
Haze at 0 °C	Hach, LG Auto Monitek, Dr Lange Haffmans/VOS, Sigrist, Optek	≤1.0 >1.0	RMean	0.10 0.15	EBC	2
Haze at 20 °C	Hach, LG Auto, Monitek, Dr Lange Haffmans/VOS, Sigrist, Optek	≤1.0 >1.0	RMean	0.10 0.15	EBC	2
Carbon Dioxide	Volume expansion (e.g. Carbo QC) Pressure corrected (e.g. calculated value)	≤4.0 >4.0	RMean (all methods)	Robust SD 0.155	g/L	2
Total gas pressure	Pressure measurement (e.g. Haffmans, Zahm Nagel) Thermal conductivity (e.g. Hach, Orbisphere)	All	RMean (all methods)	Robust SD	g/L	2
Refractive Index	Refractometer	All	RMean	0.15	RI (sample) - RI (water)	2
Sulfur Dioxide	GC, Monier-Williams, Para-Rosaniline, DTNB, Ripper, Enzymatic	All	RMean	1	mg/L	0

Samples: 2L: **Lager for Chemical Analysis**
Supplied as: Four canned or bottled products (440mL or greater)

Analyte	Method	Range	AV	SDPA	Units	DP
Free Diacetyl	Gas Chromatography	All	RMean	5.00	µg/L	2
Free 2,3-Pentanedione	Gas Chromatography	All	RMean	4.00	µg/L	2
Diacetyl as VDK *(previously 'VDK as Diacetyl')*	Distillation	<0.1	RMean	0.025	mg/L	3
Dimethyl Sulfide	GC	≤35 >35	RMean	4.4 Robust SD	µg/L	0
Chloride	IC, Chloride meter	All	RMean	13.00	mg/L	2
Phosphate	IC	All	RMean	20.00	mg/L	2
Sulfate	IC	All	RMean	12.00	mg/L	2
Nitrate	IC	All	RMean	2.50	mg/L	2
FAN	All	All	RMean	5.00	mg/L	2
TSN	All	All	RMean	15.50	mg/L	2
Foam stability (HRV)	Rudin	All	RMean	7	seconds	0
	NIBEM - 10mm	All	RMean	10	seconds	0
	NIBEM - 20mm	All	RMean	15	seconds	0
	NIBEM - 30mm	All	RMean	18	seconds	0
	Steinfurth	All	RMean	Robust SD	seconds	0
	LG Auto	All	RMean	Robust SD	seconds	0
Acetaldehyde	GC	All	RMean	1.00	mg/L	2
Ethyl Acetate	GC	All	RMean	2.00	mg/L	2
n-Propanol	GC	≤14 >14	RMean	1.40 10% of AV	mg/L	2
iso-Butanol	GC	≤15 >15	RMean	1.50 10% of AV	mg/L	2
2-Methyl Butanol	GC	≤10 >10	RMean	1.00 10% of AV	mg/L	1
3-Methyl Butanol	GC	≤58 >58	RMean	5.80 10% of AV	mg/L	1
2+3 Methyl Butanol	GC	≤36 >36	RMean	3.60 10% of AV	mg/L	1
iso-Amyl Acetate	GC	≤2 >2	RMean	0.20 10% of AV	mg/L	2

Ethyl Hexanoate	GC	≤0.4 >0.4	RMean	0.04 10% of AV	mg/L	2
Iso-α-acids	HPLC	All	RMean	10% of AV	mg/L	2
Tetra-iso-α-acids	HPLC	All	RMean	0.50	mg/L	2
Total Polyphenols	All	All	RMean	9.00	mg/L	2
Calcium	AAS, ICP-OES, ICP-MS, IC, Flame photometry, Colorimetery, Titration	All	RMean	7.5% of AV	mg/L	2
Magnesium	AAS, ICP-OES, ICP-MS, IC, Flame photometry, Colorimetery, Titration	All	RMean	5% of AV	mg/L	2
Potassium	Flame photometry, IC, AAS, Chloride analyser, Titration	All	RMean	5% of AV	mg/L	2
Sodium	Flame photometry, IC, AAS, Chloride analyser, Titration	All	RMean	7.5% of AV	mg/L	2
Dimethyl disulfide	GC	All	RMean	Robust SD	µg/L	1
Methylthioacetate	GC	All	RMean	Robust SD	µg/L	1
Hydrogen sulfide	GC	All	RMean	Robust SD	µg/L	1
Methanethiol	GC	All	RMean	Robust SD	µg/L	1
Glucose	HPLC	All	RMean	Robust SD	%	2
Maltose	HPLC	All	RMean	Robust SD	%	2
Maltotriose	HPLC	All	RMean	Robust SD	%	2
Maltotetraose	HPLC	All	RMean	Robust SD	%	2
Total carbohydrate	Calculation	All	RMean	Robust SD	% w/w	2
Energy value (kcal)	Calculation	All	RMean	1.0	kcal/100ml	1
Energy value (kJ)	Calculation	All	RMean	5	kJ/100ml	0
Iron	AAS ICP-OES ICP-MS Spectrophotometer (1,10-phenanthroline) Spectrophotometer (Ferrozine)	≤0.1 >0.1	RMean	0.015 Robust SD	mg/L	3
Copper	AAS ICP-OES ICP-MS	≤0.1 >0.1	RMean	0.010 Robust SD	mg/L	3

Zinc	AAS ICP-OES ICP-MS	All	RMean	Robust SD	mg/L	3

Sample: 3 **Analysis of samples with high bitterness and/or high colour content**
Supplied as: One canned or bottled product (330mL or greater)

Analyte	Method	Range	AV	SDPA	Units	DP
Alcohol by Volume	All	4-12%	RMean	0.05	% ABV	2
Bitterness	Extract/ Spectrophotometer	All	RMean	1.70	BU	2
Colour at 430nm	All methods	All	RMean	2.00	EBC	2
Colour at 530nm	All methods	All	RMean	2.00	EBC	2
Iso-α-acids	HPLC	All	RMean	10% of AV	mg/L	2
Tetra iso-α-acids	HPLC	All	RMean	0.50	mg/L	2
Free Diacetyl	Gas Chromatography	All	RMean	9.00	µg/L	2
Free 2,3-Pentanedione	Gas Chromatography	All	RMean	4.00	µg/L	2
Diacetyl as VDK *(previously 'VDK as Diacetyl')*	Distillation	<0.1	RMean	0.025	mg/L	3

Sample 4: **Samples for Microbiological Analysis**
Sample 4L: Low-level sample for membrane filtration
Supplied as: 1 x 10ml freeze-dried vial to be resuscitated in 1000ml diluent (not supplied)

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic microbial count	MF LYSINE MF UNIVERSAL BEER MF RAKA RAY MF WLN MF WLD	<300	RMean	0.28	cfu per 100ml	0
Total anaerobic microbial count		<300	RMean	0.28	cfu per 100ml	0
Total aerobic bacterial count		<300	RMean	0.28	cfu per 100ml	0
Wild yeast enumeration		<300	RMean	0.28	cfu per 100ml	0
Lactic acid bacteria enumeration		<300	RMean	0.28	cfu per 100ml	0
Identity of Organism	BIOCHEMICAL MICROSCOPY SEROLOGY SELECTIVE AGAR MOLECULAR	NA	NA	NA	NA	NA

Sample 4H: High-level sample for plate count (spread or pour)
Supplied as: 1 x 10ml freeze-dried vial to be resuscitated in 100ml diluent (not supplied)

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic microbial count	SP LYSINE SP UNIVERSAL BEER SP RAKA RAY SP WLN SP WLD	<500	RMean	0.28	cfu per ml	0
Total anaerobic microbial count		<500	RMean	0.28	cfu per ml	0
Total aerobic bacterial count		<500	RMean	0.28	cfu per ml	0
Wild yeast enumeration		<500	RMean	0.28	cfu per ml	0
Lactic acid bacteria enumeration		<500	RMean	0.28	cfu per ml	0
Identity of Organism	BIOCHEMICAL MICROSCOPY SEROLOGY SELECTIVE AGAR MOLECULAR	NA	NA	NA	NA	NA

Sample 5: **Lager/Ale (Bitter) for Sensory Analysis**
Supplied as: Four canned or bottled products (440mL or greater)

Descriptors (scored from 0-9)	Definition	Aroma	Taste	AV
Fruity / Estery	Tropical / Summer fruits – Strawberry, Raspberry, Peach, Apricot, Kiwi fruit, Pineapple, Bananas, Pear drops, Mangoes, Candy sticks, Melon, Cherry, Blackberry			The materials supplied are assessed and all aroma/taste attribute assigned values are set by the Campden BRI Sensory Expert Panel
Alcoholic / Solvent	Ethanolic, Vinous, Warming, Raw, Higher alcohols			
Fruity / Citrus	Grapefruit, Lemon, Lime and Orange			
Hop	Fresh hop, Resinous, Grassy, Floral, Spicy and Herbal			
DMS	Sweetcorn, Baked beans, Tinned tomatoes			
Cereal	Cereal, Grainy, Hay, Straw, Worty, Bran			
Malty	Malty, Nutty, Liquorice, Chocolate, Vanilla			
Caramel	Toffee, Caramel, Treacle			
Burnt	Smokey, Peaty, Burnt Toast, Liquorice			
Other Sulfur	Sulfidic (eggs), Sulfitic (struck Match), Yeasty, Bready, Meaty, Drains, Garlic, Onions, Cooked Vegetable, Lightstruck			
Oxidised / Aged	Papery, Cardboard, Bready, Catty, Musty, Acetaldehyde, Metallic			
Sweet	Sugar, Saccharin, Honey, Syrupy, Cloying			
Bitter	Tonic water, Quinine			

Sour	Acidic			
Astringent	Tannic, Drying, Cold tea, Green tea			
Body	Thin, Watery, Thick, Full			
Linger	Length, Finish, Aftertaste – Duration & Quality			
Other	e.g. Diacetyl, , Rancid, Cheesy, Lactic acid, Acetic acid Phenolic, Chlorophenolic, etc.			

Not assessed

Sample: 7 **Alcohol free/low alcohol beer for Chemical Analysis**
Supplied as: One canned or bottled product (usually 330mL or greater)

Analyte	Method	Range	AV	SDPA % (fixed)	Units	DP
ABV (qualitative)	All methods	Alcohol free (≤0.05% ABV) Low alcohol (>0.05% ABV)	RMean	-	-	-
ABV (quantitative)	All methods	0 - 0.5**	RMean	Robust SD	% ABV	2
Apparent Gravity *(Present Gravity)*	All	All	RMean	0.03	°Plato	2
Bitterness	Extract/ Spectrophotometer		RMean	Robust SD	BU	2
Colour @ 430 nm	Spectrophotometer	≤20	RMean	0.3	EBC	1
	Colorimeter	>20		1.0		
	Other					
pH	pH Meter	All	RMean	0.05	pH Units	2

**Alcohol may not present above laboratory reporting limits in some of the test materials provided.