

# DAPS

## Alcoholic Drinks Proficiency Testing Scheme

## Scheme Description

### LGC

#### Proficiency Testing

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## Record of issue status and modifications

| ISSUE | ISSUE DATE | DETAILS                                                                                                                                                                                                                                    | AUTHORISED BY           |
|-------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 6     | Jan 2013   | Change of scheme year from April-March to January-December. Amended number of samples for C1 to '2'. Alteration of SDPAs in Group B. Increased number of DP for Cu and Fe in Group B                                                       | M. Whetton              |
| 7     | Sept 2013  | Clarification of SDPAs to be used in B2.                                                                                                                                                                                                   | M. Whetton              |
| 8     | April 2014 | Alteration of sample volumes for Group E and simulant samples                                                                                                                                                                              | M. Whetton              |
| 9     | Sept 2014  | Updated email and website address on front page. 'Round specific' analytes in B4 and E4 available in all rounds. Inclusion of traceability information in Appendix A. Inclusion of subcontracting information in 'Test Materials' section. | M. Whetton              |
| 10    | Apr 2015   | General revision. Total haze added to 'E' samples. Additional method details included. New analytes added for B1, B3, E1 & E3                                                                                                              | W. Gaunt                |
| 11    | Sept 2015  | Addition of sample B5 (esters) and cask extracts to B1. General update of appendices<br>Removed Hard copy report information                                                                                                               | W. Gaunt<br>A. McCarthy |
| 12    | Jan 2016   | General update of cask extractives & esters in B1 & B5                                                                                                                                                                                     | W. Gaunt                |
| 13    | Sept 2016  | Minor changes made to the methods. Turbidity and haze combined for B1 and B2.                                                                                                                                                              | W. Gaunt                |
| 14    | Sept 2017  | Removal of 2 methyl butanol, 3 methyl butanol, acetal, acetaldehyde, ethyl acetate, isoamyl acetate, methanol, n-butanol & n-propanol from E3. Removal of sample E4. Various DPs revised.                                                  | W. Gaunt                |
| 15    | Mar 2018   | General revision and update of method information                                                                                                                                                                                          | W. Gaunt                |
| 16    | Sept 2018  | Methods updated for 2+3 methyl butanol & various acids for D1 & D2. Esters changed to 3DP. SDPA updated for cask extractives. Volatile acidity renamed to fixed acidity.                                                                   | W. Gaunt                |
| 17    | Aug 2019   | Removed 'standards' from page 1                                                                                                                                                                                                            | A. McCarthy             |
| 18    | Sep 2020   | Addition of phenol to B1<br>Split samples B2 and B3                                                                                                                                                                                        | W. Gaunt                |
| 19    | July 2021  | Updated email address and UKAS logo                                                                                                                                                                                                        | A Collins               |

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

## **Scheme Aims and Organisation**

The primary aim of the Alcoholic Drinks Proficiency Testing scheme (DAPS) is to enable laboratories performing the analysis of alcoholic beverages to monitor their performance and compare it with that of their peers. DAPS also aims to provide information to participants on technical issues and methodologies relating to testing of distilled spirits, other alcoholic beverages and fermented worts.

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

The DAPS scheme operates an advisory group made up of participants, industry experts and regulatory organisations. A list of advisory group members is available from LGC Standards on request. The advisory group meets twice a year and is concerned with all aspects of scheme development, operation and participant performance.

## **Test Materials**

With the exception of the simulant samples, DAPS materials are readily available commercial products, either supplied in their original packaging or bulked and sub-sampled into appropriate containers. Simulant samples are prepared gravimetrically and all samples undergo homogeneity testing prior to despatch.

Details of test materials available in DAPS 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 DAPS 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 DAPS 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**

DAPS results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email.

DAPS 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 (median) of participant results (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.

**Group A****Worts****Sample PT-DP-A1****Fermented Wort (fermented wash)****Supplied as:**

1 x 500mL wort sample

| Analyte                                                                                                    | Method                                     | AV    | SDPA | Units                     | DP |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------|------|---------------------------|----|
| Alcohol                                                                                                    | Density Meter                              | RMean | 0.10 | %ABV                      | 2  |
| Original Gravity                                                                                           | Density Meter                              | RMean | 0.50 | °sacc (report as 1XXX.XX) | 2  |
| Residual Gravity                                                                                           | Density Meter                              | RMean | 0.30 | °sacc (report as 1XXX.XX) | 2  |
| Final Gravity                                                                                              | Density Meter                              | RMean | 0.10 | °sacc (report as 1XXX.XX) | 2  |
| pH                                                                                                         | Combination electrode<br>Alcohol electrode | RMean | 0.10 | pH Units                  | 2  |
| Residual Fermentable<br>Sugars ( <i>Total Amount of<br/>Glucose, Maltose and<br/>Maltotriose present</i> ) | Various                                    | RMean | RSD  | g/100ml                   | 2  |

**Sample PT-DP-A2****Simulated Wort****Supplied as:**

1 x 250mL simulated wort sample

| Analyte                                                                                                    | Method        | AV          | SDPA | Units                     | DP |
|------------------------------------------------------------------------------------------------------------|---------------|-------------|------|---------------------------|----|
| Alcohol                                                                                                    | Density Meter | Formulation | 0.10 | %ABV                      | 2  |
| Original Gravity                                                                                           | Density Meter | RMean       | 0.50 | °sacc (report as 1XXX.XX) | 2  |
| Residual Gravity                                                                                           | Density Meter | RMean       | 0.10 | °sacc (report as 1XXX.XX) | 2  |
| Final Gravity                                                                                              | Density Meter | RMean       | 0.10 | °sacc (report as 1XXX.XX) | 2  |
| Residual Fermentable<br>Sugars ( <i>Total Amount of<br/>Glucose, Maltose and<br/>Maltotriose present</i> ) | Various       | RMean       | RSD  | g/100ml                   | 2  |

**Group B****Distilled Spirits****Sample PT-DP-B1****Scotch whisky****Supplied as:**

1 x 300mL bottle of commercially available Scotch whisky

| Analyte                                                  | Method                                        | AV    | SDPA       | Units                                       | DP |
|----------------------------------------------------------|-----------------------------------------------|-------|------------|---------------------------------------------|----|
| Apparent alcoholic strength                              | Density Meter                                 | RMean | 0.03       | %ABV                                        | 2  |
| Actual alcoholic strength                                | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08       | %ABV                                        | 2  |
| pH                                                       | Combination electrode<br>Alcohol electrode    | RMean | 0.20       | pH Units                                    | 2  |
| Colour                                                   | CIU                                           | RMean | 3          | Colour Units                                | 2  |
|                                                          | Dr Lange                                      | RMean | 0.50       | Colour Units                                | 2  |
| Turbidity ( <i>Haze</i> )                                | Various                                       | RMean | 0.20       | Haze units                                  | 2  |
|                                                          |                                               | RMean | RSD        | NTU                                         | 2  |
| Acetaldehyde                                             | GC                                            | RMean | 10% (20%*) | g/100L Absolute Alcohol                     | 2  |
| Ethyl acetate                                            | Distillation and GC<br>GC only                | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| Acetal                                                   | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| n-Propanol                                               | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| Methanol                                                 | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| n-Butanol                                                | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| iso-Butanol                                              | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| 2-Methyl butanol                                         | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| 3-Methyl butanol                                         | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| 2 + 3 Methyl butanol                                     | GC<br>Calculated                              | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| iso-Amyl acetate                                         | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| Furfural                                                 | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol                     | 2  |
| Ethyl carbamate                                          | Various                                       | RMean | RSD        | µg/L                                        | 2  |
| NDMA                                                     | Various                                       | RMean | RSD        | µg/L                                        | 2  |
| Phenol                                                   | Chromatographic,<br>Colorimetric, HPLC, GC-MS | RMean | RSD        | mg/L                                        | 2  |
| Fixed acidity ( <i>previously<br/>volatile acidity</i> ) | Titration                                     | RMean | 10%        | g/100L Absolute Alcohol<br>(as acetic acid) | 2  |

## DAPS Scheme Description

| Analyte                 | Method                                     | AV    | SDPA          | Units                                    | DP |
|-------------------------|--------------------------------------------|-------|---------------|------------------------------------------|----|
| Total acidity           | Titration                                  | RMean | 10%           | g/100L Absolute Alcohol (as acetic acid) | 2  |
| Calcium                 | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | 15%           | mg/L                                     | 2  |
| Magnesium               | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | 15%           | mg/L                                     | 2  |
| Sodium                  | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | 15%           | mg/L                                     | 2  |
| Potassium               | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | 15%           | mg/L                                     | 2  |
| Copper                  | AAS, ICP-OES, ICP-MS                       | RMean | RSD           | mg/L                                     | 3  |
| Iron                    | AAS, ICP-OES, ICP-MS                       | RMean | RSD           | mg/L                                     | 3  |
| Total sugars            | HPLC, IC                                   | RMean | RSD           | mg/L                                     | 2  |
| Fructose                | HPLC, IC                                   | RMean | 10%           | mg/L                                     | 2  |
| Glucose                 | HPLC, IC                                   | RMean | 10%           | mg/L                                     | 2  |
| Sucrose                 | HPLC, IC                                   | RMean | 10%           | mg/L                                     | 2  |
| Specific gravity (20°C) | Density Meter<br>Pycnometer                | RMean | RSD           | -                                        | 5  |
| Density (20°C)          | Various                                    | RMean | RSD           | g/ml                                     | 5  |
| Refractive Index (20°C) | Refractometer                              | RMean | RSD           | -                                        | 4  |
| Total solids            | Various                                    | RMean | RSD           | g/100ml                                  | 2  |
| Chill difference        | PTC-WC-015                                 | RMean | RSD           | NTU                                      | 2  |
| <b>Cask extractives</b> |                                            |       |               |                                          |    |
| 5-HMF                   | HPLC, UPLC, GC                             | RMean | 10% (min 0.1) | mg/L**                                   | 2  |
| Coniferaldehyde         | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Ellagic Acid            | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Gallic Acid             | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Scopoletin              | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Sinapaldehyde           | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Syringaldehyde          | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Syringic Acid           | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Vanillic Acid           | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| Vanillin                | HPLC, UPLC, GC                             | RMean | 20% (min 0.1) | mg/L**                                   | 2  |
| <b>Esters</b>           |                                            |       |               |                                          |    |

## DAPS Scheme Description

| Analyte               | Method   | AV    | SDPA      | Units                     | DP |
|-----------------------|----------|-------|-----------|---------------------------|----|
| Ethyl Hexanoate       | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Octanoate       | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Decanoate       | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| 2-Phenethyl Acetate   | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Dodecanoate     | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| 2-Phenethyl Ethanol   | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Tetradecanoate  | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Hexadecanoate   | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl-9-Hexadecenoate | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |

\*where the assigned value is <10g/100L the larger SDPA will be used in the calculation of the performance score.

\*\*to be reported in the sample as provided

**Sample PT-DP-B2 (A, B, C & D) Dark Distilled Spirits**

**Supplied as:**

1 x 300mL bottle of commercially available dark distilled spirit

| Analyte                     | Method                                        | AV    | SDPA       | Units                   | DP |
|-----------------------------|-----------------------------------------------|-------|------------|-------------------------|----|
| Apparent alcoholic strength | Density Meter                                 | RMean | 0.03       | %ABV                    | 2  |
| Actual alcoholic strength   | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08       | %ABV                    | 2  |
| pH                          | Combination electrode<br>Alcohol electrode    | RMean | 0.20       | pH Units                | 2  |
| Colour                      | CIU                                           | RMean | RSD        | Colour Units            | 2  |
|                             | Dr Lange                                      | RMean | RSD        | Colour Units            | 2  |
| Turbidity ( <i>Haze</i> )   | Various                                       | RMean | 0.20       | Haze units              | 2  |
|                             |                                               | RMean | RSD        | NTU                     | 2  |
| Acetaldehyde                | GC                                            | RMean | 10% (20%*) | g/100L Absolute Alcohol | 2  |
| Ethyl acetate               | Distillation and GC<br>GC only                | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |
| Acetal                      | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |
| n-Propanol                  | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |
| Methanol                    | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |
| n-Butanol                   | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |
| iso-Butanol                 | GC                                            | RMean | 5% (20%*)  | g/100L Absolute Alcohol | 2  |

## DAPS Scheme Description

| Analyte                                              | Method                                        | AV    | SDPA      | Units                                       | DP |
|------------------------------------------------------|-----------------------------------------------|-------|-----------|---------------------------------------------|----|
| 2-Methyl butanol                                     | GC                                            | RMean | 5% (20%*) | g/100L Absolute Alcohol                     | 2  |
| 3-Methyl butanol                                     | GC                                            | RMean | 5% (20%*) | g/100L Absolute Alcohol                     | 2  |
| 2 + 3 Methyl butanols                                | GC<br>Calculated                              | RMean | 5% (20%*) | g/100L Absolute Alcohol                     | 2  |
| iso-Amyl acetate                                     | GC                                            | RMean | 5% (20%*) | g/100L Absolute Alcohol                     | 2  |
| Furfural                                             | GC                                            | RMean | 5% (20%*) | g/100L Absolute Alcohol                     | 2  |
| Acetic acid                                          | GC                                            | RMean | RSD       | g/100L Absolute Alcohol                     | 2  |
| Ethyl carbamate                                      | Various                                       | RMean | RSD       | µg/L                                        | 2  |
| NDMA                                                 | Various                                       | RMean | RSD       | µg/L                                        | 2  |
| Fixed acidity ( <i>previously volatile acidity</i> ) | Titration                                     | RMean | 10%       | g/100L Absolute Alcohol<br>(as acetic acid) | 2  |
| Total acidity                                        | Titration                                     | RMean | 10%       | g/100L Absolute Alcohol<br>(as acetic acid) | 2  |
| Total sugars                                         | HPLC, IC                                      | RMean | RSD       | mg/L                                        | 2  |
| Fructose                                             | HPLC, IC                                      | RMean | 10%       | mg/L                                        | 2  |
| Glucose                                              | HPLC, IC                                      | RMean | 10%       | mg/L                                        | 2  |
| Sucrose                                              | HPLC, IC                                      | RMean | 10%       | mg/L                                        | 2  |
| Calcium                                              | Flame photometry, IC, AAS,<br>ICP-OES, ICP-MS | RMean | 15%       | mg/L                                        | 2  |
| Magnesium                                            | Flame photometry, IC, AAS,<br>ICP-OES, ICP-MS | RMean | 15%       | mg/L                                        | 2  |
| Sodium                                               | Flame photometry, IC, AAS,<br>ICP-OES, ICP-MS | RMean | 15%       | mg/L                                        | 2  |
| Potassium                                            | Flame photometry, IC, AAS,<br>ICP-OES, ICP-MS | RMean | 15%       | mg/L                                        | 2  |
| Copper                                               | AAS<br>ICP-OES<br>ICP-MS                      | RMean | RSD       | mg/L                                        | 3  |
| Iron                                                 | AAS<br>ICP-OES<br>ICP-MS                      | RMean | RSD       | mg/L                                        | 3  |

\*where the assigned value is <10g/100L the larger SDPA will be used in the calculation of the performance score.

# DAPS Scheme Description

## Sample PT-DP-B3 (A, B & C)

Supplied as:

## Clear Distilled Spirits

1 x 300mL bottle commercially available clear distilled spirit

| Analyte                                              | Method                                        | AV    | SDPA | Units                                       | DP          |
|------------------------------------------------------|-----------------------------------------------|-------|------|---------------------------------------------|-------------|
| Apparent alcoholic strength                          | Density Meter                                 | RMean | 0.03 | %ABV                                        | 2<br>2      |
| Actual alcoholic strength                            | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08 | %ABV                                        | 2<br>2<br>2 |
| pH                                                   | Combination electrode<br>Alcohol electrode    | RMean | 0.50 | pH Units                                    | 2<br>2      |
| Acetaldehyde                                         | GC                                            | RMean | 10%* | g/100L Absolute Alcohol                     | 2           |
| Ethyl acetate                                        | Distillation and GC<br>GC only                | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| Acetal                                               | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| n-Propanol                                           | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| Methanol                                             | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| n-Butanol                                            | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| iso-Butanol                                          | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| 2-Methyl Butanol                                     | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| 3-Methyl Butanol                                     | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| 2 + 3-Methyl Butanol                                 | GC<br>Calculated                              | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| iso-Amyl acetate                                     | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| Furfural                                             | GC                                            | RMean | 5%*  | g/100L Absolute Alcohol                     | 2           |
| Acetic acid                                          | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2           |
| Ethyl carbamate                                      | Various                                       | RMean | RSD  | µg/L                                        | 2           |
| NDMA                                                 | Various                                       | RMean | RSD  | µg/L                                        | 2           |
| Fixed acidity ( <i>previously volatile acidity</i> ) | Titration                                     | RMean | RSD  | g/100L Absolute Alcohol<br>(as acetic acid) | 2           |
| Total acidity                                        | Titration                                     | RMean | RSD  | g/100L Absolute Alcohol<br>(as acetic acid) | 2           |
| Total sugars                                         | HPLC, IC                                      | RMean | RSD  | mg/L                                        | 2           |
| Fructose                                             | HPLC, IC                                      | RMean | RSD  | mg/L                                        | 2           |
| Glucose                                              | HPLC, IC                                      | RMean | RSD  | mg/L                                        | 2           |

# DAPS Scheme Description

| Analyte                            | Method                                     | AV    | SDPA | Units                    | DP |
|------------------------------------|--------------------------------------------|-------|------|--------------------------|----|
| Sucrose                            | HPLC, IC                                   | RMean | RSD  | mg/L                     | 2  |
| Linalool ( <i>gin only</i> )       | GC                                         | RMean | RSD  | g/1000L Absolute Alcohol | 2  |
| Terpinene-4-ol ( <i>gin only</i> ) | GC                                         | RMean | RSD  | g/1000L Absolute Alcohol | 2  |
| Calcium                            | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | RSD  | mg/L                     | 2  |
| Magnesium                          | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | RSD  | mg/L                     | 2  |
| Sodium                             | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | RSD  | mg/L                     | 2  |
| Potassium                          | Flame photometry, IC, AAS, ICP-OES, ICP-MS | RMean | RSD  | mg/L                     | 2  |
| Copper                             | AAS<br>ICP-OES<br>ICP-MS                   | RMean | RSD  | mg/L                     | 3  |
| Iron                               | AAS<br>ICP-OES<br>ICP-MS                   | RMean | RSD  | mg/L                     | 3  |
| Specific gravity (20°C)            | Density Meter<br>Pycnometer                | RMean | RSD  | -                        | 5  |
| Density (20°C)                     | Various                                    | RMean | RSD  | g/ml                     | 5  |
| Turbidity                          | Various                                    | RMean | RSD  | NTU                      | 2  |
| Refractive Index (20°C)            | Refractometer                              | RMean | RSD  | -                        | 4  |
| Colour                             | PTC-WC-003                                 | RMean | RSD  | CCS                      | 2  |

\*where the assigned value is <10g/100L the RSD is used in the calculation of the performance score.

Note: levels for some higher alcohol analytes may be higher due to spiking when vodka products are provided.

## DAPS Scheme Description

**Sample PT-DP-B4****Supplied as:****Simulated Spirit**

1 x 250mL simulated spirit sample

| Analyte                     | Method                                        | AV          | SDPA | Units    | DP |
|-----------------------------|-----------------------------------------------|-------------|------|----------|----|
| Apparent alcoholic strength | Density Meter                                 | RMean       | 0.03 | %ABV     | 2  |
| Actual alcoholic strength   | Distillation & Density Meter<br>NIR/alcolyser | Formulation | 0.08 | %ABV     | 2  |
| pH                          | Combination electrode<br>Alcohol electrode    | RMean       | RSD  | pH Units | 2  |
| Ethyl carbamate             | Various                                       | Formulation | RSD  | µg/L     | 2  |
| NDMA                        | Various                                       | Formulation | 15%  | µg/L     | 2  |
| Total sugars                | HPLC, IC                                      | Formulation | RSD  | mg/L     | 2  |
| Fructose                    | HPLC, IC                                      | Formulation | 10%  | mg/L     | 2  |
| Glucose                     | HPLC, IC                                      | Formulation | 10%  | mg/L     | 2  |
| Sucrose                     | HPLC, IC                                      | Formulation | 10%  | mg/L     | 2  |
| Maltose                     | HPLC, IC                                      | Formulation | 10%  | mg/L     | 2  |
| Glycerol                    | Various                                       | Formulation | RSD  | mg/L     | 2  |
| Citric acid                 | Various                                       | Formulation | RSD  | mg/L     | 2  |
| Propylene glycol            | Various                                       | Formulation | RSD  | mg/L     | 2  |

**Sample PT-DP-B5****Supplied as:****Esters**

1 x 100mL non chill filtered whisky

| Analyte                 | Method   | AV    | SDPA      | Units                     | DP |
|-------------------------|----------|-------|-----------|---------------------------|----|
| Ethyl Hexanoate         | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Octanoate         | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Decanoate         | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| 2-Phenethyl Acetate     | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Dodecanoate       | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| 2-Phenethyl Ethanol     | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Tetradecanoate    | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Hexadecanoate     | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl-9-Hexadecenoate   | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Octadecanoate     | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Oleate (C18:1)    | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |
| Ethyl Linoleate (C18:2) | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |

# DAPS Scheme Description

| Analyte                  | Method   | AV    | SDPA      | Units                     | DP |
|--------------------------|----------|-------|-----------|---------------------------|----|
| Ethyl Linolenate (C18:3) | GC, GCMS | RMean | Robust SD | g/100L (absolute alcohol) | 3  |

## Group C

## Ciders

### Sample PT-DP-C1

#### Supplied as:

2 x commercially available cider provided in original container

| Analyte                   | Method                                                                               | AV    | SDPA                     | Units                         | DP |
|---------------------------|--------------------------------------------------------------------------------------|-------|--------------------------|-------------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                                                          | RMean | 0.2                      | °Sacc (report as XXXX·XX)     | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser                                        | RMean | 0.08                     | %ABV                          | 2  |
| pH                        | Combination electrode<br>Alcohol electrode                                           | RMean | 0.10                     | pH Units                      | 2  |
| Volatile acidity          | Titration                                                                            | RMean | 30% of AV                | g/L (as acetic acid)          | 2  |
| Total acidity             | Titration                                                                            | RMean | 6% of AV<br>(min 0.2)    | g/L (as malic acid)           | 2  |
| Carbon dioxide            | Volume expansion<br>(e.g. Carbo QC)<br>Pressure corrected<br>(e.g. calculated value) | RMean | 5% of AV                 | g/L                           | 2  |
| Colour                    | Spectrophotometer                                                                    | RMean | 0-10: 0.3<br>>10-40: 1.5 | °EBC                          | 2  |
| Total sulfur dioxide      | GC, Monier-Williams, Para-<br>Rosaniline, DTNB, Ripper,<br>Enzymatic                 | RMean | 15% of AV                | mg/L (total SO <sub>2</sub> ) | 2  |
| Haze                      | Various                                                                              | RMean | 0.1                      | EBC                           | 2  |

**Group D****Wines and Fortified Wines****Sample PT-DP-D1****White/Rosé wine****Supplied as:**

1 x 500mL bottle of commercially available white or rosé wine

| Analyte                   | Method                                                                                                              | AV    | SDPA      | Units                     | DP |
|---------------------------|---------------------------------------------------------------------------------------------------------------------|-------|-----------|---------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                                                                                         | RMean | 0.10      | °Sacc (report as XXXX.XX) | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser                                                                       | RMean | 0.08      | %ABV                      | 2  |
| pH                        | Combination electrode<br>Alcohol electrode                                                                          | RMean | 0.10      | pH Units                  | 2  |
| Reducing sugars           | OIV-MA-AS311<br>Enzymatic<br>FTIR<br>HPLC<br>Calculated                                                             | RMean | RSD       | g/L                       | 2  |
| Glucose                   | HPLC, Enzymatic, IC                                                                                                 | RMean | RSD       | g/L                       | 2  |
| Fructose                  | HPLC, Enzymatic, IC                                                                                                 | RMean | RSD       | g/L                       | 2  |
| Ascorbic acid             | Titration, HPLC, LCMS                                                                                               | RMean | 3         | mg/L                      | 2  |
| Citric acid               | HPLC, LCMS, FTIR,<br>Enzymatic                                                                                      | RMean | RSD       | mg/L                      | 2  |
| Sorbic acid               | HPLC, LCMS, FTIR,<br>Enzymatic                                                                                      | RMean | 3         | mg/L                      | 2  |
| Lactic acid               | HPLC, LCMS, FTIR,<br>Enzymatic                                                                                      | RMean | RSD       | g/L                       | 2  |
| Malic acid                | HPLC, LCMS, FTIR,<br>Enzymatic                                                                                      | RMean | 0.1       | g/L                       | 2  |
| Volatile acidity          | Titration                                                                                                           | RMean | 0.07      | g/L (as acetic acid)      | 2  |
| Total acidity             | Titration                                                                                                           | RMean | 0.30      | g/L (as tartaric acid)    | 2  |
| Colour @ 420nm            | Spectrophotometer                                                                                                   | RMean | RSD       | Absorbance in 1cm cell    | 3  |
| Colour @ 520nm            | Spectrophotometer                                                                                                   | RMean | RSD       | Absorbance in 1cm cell    | 3  |
| Colour @ 620nm            | Spectrophotometer                                                                                                   | RMean | RSD       | Absorbance in 1cm cell    | 3  |
| Total sulfur dioxide*     | GC, Monier-Williams, Para-<br>Rosaniline, DTNB, Ripper,<br>Enzymatic, OIV-MA-AS32,<br>Iodometry, Areation-oxidation | RMean | 15% of AV | mg/L                      | 2  |

# DAPS Scheme Description

| Analyte              | Method                                     | AV    | SDPA      | Units | DP |
|----------------------|--------------------------------------------|-------|-----------|-------|----|
| Free sulfur dioxide* | OIV-MA-AS32, Iodometry, Aeration-oxidation | RMean | 25% of AV | mg/L  | 2  |
| Copper               | AAS                                        | RMean | 0.05      | mg/L  | 2  |
| Iron                 | AAS                                        | RMean | 0.1       | mg/L  | 2  |

\*Participants should ensure that they analyse the samples for sulfur dioxide within the dates stipulated on the sample label

## Sample PT-DP-D2

## Red wine

### Supplied as:

1 x 500mL bottle of commercially available red wine

| Analyte                   | Method                                                  | AV    | SDPA | Units                     | DP |
|---------------------------|---------------------------------------------------------|-------|------|---------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                             | RMean | 0.10 | °Sacc (report as XXXX·XX) | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser           | RMean | 0.08 | %ABV                      | 2  |
| pH                        | Combination electrode                                   | RMean | 0.10 | pH Units                  | 2  |
|                           | Alcohol electrode                                       |       |      |                           |    |
| Reducing sugars           | OIV-MA-AS311<br>Enzymatic<br>FTIR<br>HPLC<br>Calculated | RMean | RSD  | g/L                       | 2  |
| Glucose                   | HPLC, Enzymatic, IC                                     | RMean | RSD  | g/L                       | 2  |
| Fructose                  | HPLC, Enzymatic, IC                                     | RMean | RSD  | g/L                       | 2  |
| Ascorbic acid             | Titration, HPLC, LCMS                                   | RMean | 3    | mg/L                      | 2  |
| Citric acid               | HPLC, LCMS, FTIR,<br>Enzymatic                          | RMean | RSD  | mg/L                      | 2  |
| Sorbic acid               | HPLC, LCMS, FTIR,<br>Enzymatic                          | RMean | 3    | mg/L                      | 2  |
| Lactic acid               | HPLC, LCMS, FTIR,<br>Enzymatic                          | RMean | RSD  | g/L                       | 2  |
| Malic acid                | HPLC, LCMS, FTIR,<br>Enzymatic                          | RMean | 0.1  | g/L                       | 2  |
| Volatile acidity          | Titration                                               | RMean | 0.07 | g/L (as acetic acid)      | 2  |

# DAPS Scheme Description

| Analyte               | Method                                                                                                      | AV    | SDPA | Units                  | DP |
|-----------------------|-------------------------------------------------------------------------------------------------------------|-------|------|------------------------|----|
| Total acidity         | Titration                                                                                                   | RMean | 0.30 | g/L (as tartaric acid) | 2  |
| Colour @ 420nm        | Spectrophotometer                                                                                           | RMean | RSD  | Absorbance in 1cm cell | 3  |
| Colour @ 520nm        | Spectrophotometer                                                                                           | RMean | RSD  | Absorbance in 1cm cell | 3  |
| Colour @ 620nm        | Spectrophotometer                                                                                           | RMean | RSD  | Absorbance in 1cm cell | 3  |
| Total sulfur dioxide* | GC, Monier-Williams, Para-Rosaniline, DTNB, Ripper, Enzymatic, OIV-MA-AS32, Iodometry, Areatation-oxidation | RMean | 5    | mg/L                   | 2  |
| Free sulfur dioxide*  | OIV-MA-AS32, Iodometry, Areatation-oxidation                                                                | RMean | 5    | mg/L                   | 2  |
| Copper                | AAS                                                                                                         | RMean | 0.05 | mg/L                   | 2  |
| Iron                  | AAS                                                                                                         | RMean | 0.1  | mg/L                   | 2  |

\*Participants should ensure that they analyse the samples for sulfur dioxide within the dates stipulated on the sample label.

## Group E

## Other Alcoholic Beverages

### Sample PT-DP-E1

### Fruit flavoured drink

#### Supplied as:

2 x commercially available fruit flavoured 'ready to drink' beverages provided in the original containers (ABV<10%)

| Analyte                   | Method                                        | AV    | SDPA | Units                     | DP |
|---------------------------|-----------------------------------------------|-------|------|---------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                   | RMean | 0.30 | °Sacc (report as XXXX·XX) | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08 | %ABV                      | 2  |
| pH                        | Combination electrode<br>Alcohol electrode    | RMean | 0.10 | pH Units                  | 2  |
| Total sugars              | Lane & Eynon                                  | RMean | RSD  | g/L                       | 2  |
| Ascorbic acid             | Various                                       | RMean | RSD  | mg/L                      | 2  |
| Citric acid               | Various                                       | RMean | RSD  | mg/L                      | 2  |
| Benzoic acid              | HPLC                                          | RMean | RSD  | mg/L                      | 2  |
| Sorbic acid               | HPLC                                          | RMean | RSD  | mg/L                      | 2  |
| Carbon dioxide            | Various                                       | RMean | RSD  | g/L                       | 2  |
| Volatile acidity          | Titration                                     | RMean | RSD  | g/L (as acetic acid)      | 2  |

## DAPS Scheme Description

| Analyte                 | Method                        | AV    | SDPA   | Units                | DP |
|-------------------------|-------------------------------|-------|--------|----------------------|----|
| Total acidity           | Titration                     | RMean | RSD    | g/L (as citric acid) | 2  |
| Total brix              | Densitometer<br>Refractometer | RMean | RSD    | °Brix                | 2  |
| Density (20°C)          | Various                       | RMean | 0.0005 | g/ml                 | 4  |
| Refractive Index (20°C) | Refractometer                 | RMean | 0.0001 | -                    | 4  |
| Dissolved oxygen        | Various                       | RMean | RSD    | ppm                  | 2  |
| Colour absorbance       | 430nm, 500nm, 630nm           | RMean | RSD    | -                    | 2  |

**Sample PT-DP-E2**
**Supplied as:**
**Liqueur**

1 x 300mL bottle of commercially available liqueur (ABV 20-40%)

| Analyte                   | Method                                        | AV    | SDPA | Units                                       | DP |
|---------------------------|-----------------------------------------------|-------|------|---------------------------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                   | RMean | 0.30 | °Sacc (report as XXXX·XX)                   | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08 | %ABV                                        | 2  |
| pH                        | Combination electrode<br>Alcohol electrode    | RMean | 0.20 | pH Units                                    | 2  |
| Residue                   | Various                                       | RMean | RSD  | g/100mL                                     | 2  |
| Volatile acidity          | Titration                                     | RMean | RSD  | g/100L Absolute Alcohol<br>(as acetic acid) | 2  |
| Total acidity             | Titration                                     | RMean | RSD  | g/100L Absolute Alcohol<br>(as acetic acid) | 2  |
| Acetaldehyde              | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| Ethyl acetate             | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| Acetal                    | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| n-Propanol                | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| Methanol                  | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| n-Butanol                 | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| iso-Butanol               | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| 2-Methyl butanol          | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| 3-Methyl butanol          | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| 2+3 Methyl butanol        | GC<br>Calculated                              | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |
| iso Amyl acetate          | GC                                            | RMean | RSD  | g/100L Absolute Alcohol                     | 2  |

## DAPS Scheme Description

| Analyte    | Method                        | AV    | SDPA | Units                   | DP |
|------------|-------------------------------|-------|------|-------------------------|----|
| Furfural   | GC                            | RMean | RSD  | g/100L Absolute Alcohol | 2  |
| Total brix | Densitometer<br>Refractometer | RMean | RSD  | °Brix                   | 2  |

**Sample PT-DP-E3****Cream Liqueur****Supplied as:**

1 x 300mL bottle of commercially available cream liqueur

| Analyte                   | Method                                        | AV    | SDPA | Units                     | DP |
|---------------------------|-----------------------------------------------|-------|------|---------------------------|----|
| Specific gravity          | Density Meter<br>Pycnometer                   | RMean | 0.3  | °Sacc (report as XXXX·XX) | 2  |
| Actual alcoholic strength | Distillation & Density Meter<br>NIR/alcolyser | RMean | 0.08 | %ABV                      | 2  |
| pH                        | Combination electrode<br>Alcohol electrode    | RMean | 0.10 | pH Units                  | 2  |
| Residue                   | Various                                       | RMean | RSD  | g/100mL                   | 2  |
| iso-Butanol               | GC                                            | RMean | RSD  | g/100L Absolute Alcohol   | 2  |
| 2+3 Methyl butanols       | GC                                            | RMean | RSD  | g/100L Absolute Alcohol   | 2  |
| Furfural                  | GC                                            | RMean | RSD  | g/100L Absolute Alcohol   | 2  |
| Total Brix                | Densitometer<br>Refractometer                 | RMean | RSD  | °Brix                     | 2  |
| Refractive Index (20°C)   | Refractometer                                 | RMean | RSD  | -                         | 4  |
| Total solids              | Dried on sand                                 | RMean | RSD  | %                         | 2  |

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