Uncertainty of measurement for trace analysis methods

Analysis uncertainties are ordered by method number.

Generic definitions

Limit of quantification (LoQ): the lowest level at which a result can be confidently cited in matrix. A result of '< LoQ' indicates that the sample has no detectable residue of the analyte at a concentration equal to or greater than the LoQ for the method.

Limit of detection (LoD): the lowest value that can be positively identified as present by the instrumentation. A result of '< LoD' indicates that the sample has no detectable residue of the analyte at a concentration equal to or greater than the LoD for the method.

Uncertainty of Measurement (UoM): the uncertainty in the reported result.

Notes:

1. In some instances, levels between the LoD and the LoQ are reported as 'trace' to indicate that the compound has been positively identified but the quantitation cannot be confidently cited.

LM33/GM119 - Determination of agrochemical residues in fruits and vegetables by LC/MS/MS.

Grapes and juice (as LM33)

All compounds have a LoQ of 0.01 mg/kg except Emamectin (0.005 mg/kg), Difenoconazole and Indoxacarb (0.02 mg/kg), Azinphos methyl, Chlorpyrifos-methyl, Fenarimol, Fenitrothion, Fenvalerate, Fluazinam, Fludioxonil, Iprodione, Malathion, Methamidiphos, Parathion methyl, Procymidone, Triadimenol, THPI, Trichlofon (0.05 mg/kg) and Captan (0.1 mg/kg). Residues above the LoQ are reported to the nearest 0.01 mg/kg.

The following compounds have a UoM of ±0.01 mg/kg at levels at or below 0.05 mg/kg. UoM of ± 0.02 mg/kg from 0.05 – 0.2 mg/kg and ± 10% at levels greater than 0.2 mg/kg:

2 aminobenzimidazole	Dimethomorph	Myclobutanil	Tetraconazole
Ametoctradin	Fenamiphos	Oxadixyl	Triadimefon
Amisulbrom	Fenpyrazamine	Penconazole	Triadimenol
Atrazine	Fenpyroximate	Pendimethalin	Trichlorfon
Azoxystrobin	Flumioxamin	Proproconazole	Trifloxystrobin
Benalaxyl	Flusilazole	Proquinazid	
Buprofezin	Fluxapyroxad	Pydiflumetofen	
Carbaryl	Hexaconazole	Pyrimethanil	
Carbendazim	Iodocarb	Pyriofenone	
Chlorantranilipole	Iprodione	Simazine	
Clothianidin	Mefentrifluconazole	Spinetoram	
Cyflufenamid	Metalaxyl	Spinosad	
Cyproconazole	Methidathion	Spirotetramat	
Cyprodinil	Methiocarb	Spiroxamine	
Diazinon	Methomyl	Sulfoxaflor	

Difenoconazole	Methoxyfenozide	Tebuconazole	
Dimethoate	Metrafenone	Tebufenozide	

The following compounds will have a UoM of ±0.02 mg/kg at levels at or below 0.05 mg/kg. UoM of ± 0.03 mg/kg from 0.05 – 0.2 mg/kg and ± 15% at levels greater than 0.2 mg/kg:

Azinphos-methyl	Fenarimol	Indoxacarb	Pyraclostrobin
Boscalid	Fenhexamid	Malathion	Quinoxyfen
Chlorpyrifos	Fenitrothion	Mandipropamid	
Chlorpyrifos-methyl	Fenthion	Methamidaphos	
Emamectin	Fenvalerate	Parathion methyl	
Ethion	Fluazinam	Procymidone	
Etoxazole	Fludioxonil	Prothiofos	

Captan and THPI has a UoM of ±0.04 mg/kg at levels at or below 0.2 mg/kg and ± 20% at levels greater than 0.2 mg/kg:

Note: THPI (tetrahydrophthalamide) is a breakdown metabolite of Captan but is currently not part of any residue definition or regulatory guideline for any export market. Results are provided for informative purposes only.

Marc, pomace and fruit and vegetables

All compounds have a LoQ of 0.05 mg/kg except Captan, Fludioxonil, Fenvalerate and THPI (0.1 mg/kg). Residues above the LoQ are reported to the nearest 0.01 mg/kg.

The following compounds have a UoM of ±0.01 mg/kg at levels at or below 0.05 mg/kg. UoM of ± 0.02 mg/kg from 0.05 – 0.2 mg/kg and ± 10% at levels greater than 0.2 mg/kg:

Ametoctradin	Fenarimol	Oxadixyl
Atrazine	Fenhexamid	Parathion-methyl
Azinphos methyl	Fenitrothion	Penconazole
Azoxystrobin	Fenthion	Procymidone
Benalaxyl	Fenvalerate	Propiconazole
Boscalid	Flusilazole	Proquinazid
Buprofezin	Hexaconazole	Pyrimethanil
Carbaryl	Indoxacarb	Quinoxyfen
Carbendazim	Iprodione	Simazine
Chlorantraniliprole	Malathion	Spinetoram
Chlorpyrifos-methyl	Mandipropamid	Spinosad
Clothianidin	Metalaxyl	Spiroxamine
Cyflufenamid	Methamidiphos	Tebuconazole
Diazinon	Methidathion	Tetraconazole
Dimethoate	Methiocarb	Tebufenozide
Dimethomorph	Methomyl	THPI
Emamectin	Methoxyfenozide	Triadimefon
Etoxazole	Metrafenone	Triadimenol

Fenamiphos	Myclobutanil	Trifloxystrobin

The following compounds will have a UoM of ±0.02 mg/kg at levels at or below 0.05 mg/kg. UoM of ± 0.03 mg/kg from 0.05 – 0.2 mg/kg and ± 15% at levels greater than 0.2 mg/kg:

Chlorpyrifos	Fludioxonil
Cyprodinil	Pyraclostrobin
Ethion	Quinoxyfen

Captan has a UoM of ±0.04 mg/kg at levels at or below 0.2 mg/kg and ± 20% at levels greater than 0.2 mg/kg:

Note: THPI (tetrahydrophthalamide) is a breakdown metabolite of Captan but is currently not part of any residue definition or regulatory guideline for any export market. Results are provided for informative purposes only.

LM34/GM121-Determination of agrochemical residues in wine and liquid samples by LC/MS/MS.

All compounds have a LoQ of 0.01 mg/L except Emamectin (0.005 mg/L), Captan, Fluazinam, Fludioxonil (0.02 mg/L). Residues above the LoQ are reported to the nearest 0.01 mg/L.

The following compounds have an UoM of ±0.01 mg/L at levels at or below 0.05 mg/L. UoM of ±0.02 mg/L from 0.05 – 0.2 mg/L and 10% at levels greater than 0.2 mg/L.

2 aminobenzimidazole	Dimethoate	Metalaxyl	Spinosad
Ametoctradin	Dimethomorph	Mefentrifluconazole	Spirotetramat
Atrazine	Fenamiphos	Methidathion	Spiroxamine
Azinphos-methyl	Fenarimol	Methiocarb	Sulfoxaflor
Azoxystrobin	Fenhexamid	Methomyl	Tebuconazole
Benalaxyl	Fenpyrazamine	Metrafenone	Tebufenozide
Boscalid	Fenpyroximate	Myclobutanil	Tetraconazole
Buprofezin	Fenvalerate	Oxadixyl	Triadimefon
Carbaryl	Fluazinam	Penconazole	Triadimenol
Carbendazim	Flumioxamin	Pendimethalin	Trichlorfon
Chlorantranilipole	Flusilazole	Procymidone	Trifloxystrobin
Clothianidin	Fluxapyroxad	Proproconazole	
Cyflufenamid	Hexaconazole	Proquinazid	
Cyproconazole	Iodocarb	Pyriofenone	
Cyprodinil	Flumioxamin	Pydiflumetofen	
Diazinon	Iprodione	Simazine	

Difenoconazole	Mandipropamid	Spinetoram	

The following compounds will have a UoM of ±0.02 mg/L at levels at or below 0.05 mg/L. UoM of ± 0.03 mg/L from 0.05 – 0.2 mg/L and ± 15% at levels greater than 0.2 mg/L:

Amisulbrom	Etoxazole	Malathion	Pyraclostrobin
Chlorpyrifos	Fenthion	Methamidaphos	Pyrimethanil
Chlorpyrifos-methyl	Fenitrothion	Methoxyfenozide	Quinoxyfen
Emamectin	Fludioxonil	Parathion methyl	
Ethion	Indoxacarb	Prothiofos	

Captan has a UoM of ±0.04 mg/kg at levels at or below 0.2 mg/L and ± 20% at levels greater than 0.2 mg/L:

GM46- Oak flavour analysis in wines and wood products

Wine

Compound	LoQ (µg/L)	UoM (<10 µg/L) (± µg/L)	UoM (±)
guaiacol	1	1	10%
4-methylguaiacol	1	1	10%
***cis*-oak lactone**	10		10%
***trans*-oak lactone**	10		10%
eugenol	10		10%
vanillin	10		15%
4-ethylphenol	10		10%
4-ethylguaiacol	10		10%
furfural	10		10%
5-methylfurfural	10		10%

Wood products

The following limits have been adopted based on a 10 g/L extraction in a model wine simulant.

Compound	LoQ (µg/g)	UoM (±µg/g)
guaiacol	0.1	10%
4-methylguaiacol	0.1	10%
***cis*-oak lactone**	1	10%
***trans*-oak lactone**	1	10%
eugenol	1	10%
vanillin	1	10%
4-ethylphenol	1	10%
4-ethylguaiacol	1	10%
furfural	1	10%
5-methylfurfural	1	10%

LM25 - Determination of Ochratoxin A in wine by HPLC-FLD

The result is expressed as Ochratoxin A (µg/L for wine).

Compound	LoQ (µg/L)	UoM (< 0.1 ug/L) (±µg/L)	UoM (≥ 0.1 ug/L) (±µg/L)
Ochratoxin A	0.03	0.02	20%

Levels above the reporting limit 0.03 µg/L are reported to the nearest 0.01 µg/L.

Note: For non-wine commodities AWRI method GM63 applies and limits will be as stated above unless otherwise noted.

GM89 - Chloroanisoles in wine and cork by SPME

Wine

Compound	LoD (ng/L)	LoQ (ng/L)	UoM (±) (<10 ng/L)	UoM (±) (>10 ng/L)
2,6-DCA	10	15	5	20%
2,4-DCA	10	15	5	20%
2,4,6-TCA	1	2	1	10%
2,3,4,6-TeCA	1	2	2	20%
2,4,6-TBA	1	2	1	10%
PCA	1	2	2	20%

Oak wood

Compound	LoD (ng/L)*	LoQ (ng/L)*	UoM (±) (<10 ng/L)*	UoM (±) (>10 ng/L)*
2,6-DCA	5	7	2	20%
2,4-DCA	5	7	2	20%
2,4,6-TCA	1	2	1	10%
2,3,4,6-TeCA	1	2	2	20%
2,4,6-TBA	1	2	1	10%
PCA	1	2	2	20%

*For cork and oak samples this figure relates to the model wine extract generated from the sample. Oak samples are extracted at approx. 20 g/L in model wine and corks are extracted whole in 100 mL of model wine.

Cork

Compound	LoD (ng/cork)*	LoQ (ng/cork)*	UoM (±) (<1 ng/cork)*	UoM (±) (>10 ng/cork)*
2,6-DCA	0.5	0.7	0.2	20%
2,4-DCA	0.5	0.7	0.2	20%
2,4,6-TCA	0.1	0.2	0.1	10%
2,3,4,6-TeCA	0.1	0.2	0.2	20%
2,4,6-TBA	0.1	0.2	0.1	10%
PCA	0.1	0.2	0.2	20%

Corks are extracted whole in 100 mL of model wine and the extract analysed as per wine.

GM90- Determination of ethyl carbamate and potential ethyl carbamate in wine

Results are reported in µg/L to the nearest integer.

Compound	LoQ (µg/L)	UoM (<30 µg/L) (±µg/L)	UoM (±)
ethyl carbamate	8	3	20%

GM91- 4EP and 4EG in wine and oak by SPME

Compound	LoQ (µg/L)	UoM (< 100 µg/L) (±µg/L)	UoM (> 100 µg/L) (±)
4-ethylphenol	10	10	10%
4-ethylguaiacol	10	10	10%

GM93- Determination of Resveratrol and Piceid in wines and juice

Levels above the LoQ (0.4 mg/L) are reported to the nearest 0.1 mg/L. Between levels of 0.4 mg/L and 2.0 mg/L UoM is ±0.4 mg/L, for levels above 2.0 mg/L the UoM is ±20%.

GM95- Determination of a group of methoxypyrazines in wine, juice and grapes.

Compound	LoQ (ng/L)	UoM (<20 ng/L) (±ng/L)	UoM (>20 ng/L) (±)
IPMP	5	4	20%
SBMP	5	4	20%
IBMP	5	4	20%

Levels above the quantitation limit 5 ng/L are reported to the nearest 1 ng/L.

GM97- Determination of 2,4-D in leaves, grapes and wine

The result is expressed as total 2,4-D in mg/L for wine and is a sum of the free acid and esters, expressed as the free acid.

Residues above 0.01 mg/L are reported to the nearest 0.01 mg/L**.** A result of '< 0.01' indicates that the sample has no detectable residue of 2,4-D at a concentration equal to or greater than the limit of quantitation for the method.

Compound	LoQ (mg/L or mg/kg)	UoM <0.1 (±mg/L or mg/kg)	UoM >0.1 (±mg/L or mg/kg)
2,4-D	0.01	0.01	10%
MCPA	0.01	0.01	10%
Triclopyr	0.01	0.01	20%

GM102 - Determination of a group of halogenated phenols in wine

Compound	LoD (ng/L)	LoQ (ng/L)	UoM (<100 ng/L) (±ng/L)	UoM (>100 ng/L) (±)
2-chlorophenol	10	20	10	20%
2-bromophenol	10	20	10	20%
6-chloro-o-cresol	0.5	2	10	20%
2,4-dichlorophenol	10	20	10	20%
2,6-dichlorophenol	10	20	10	20%
3 & 4-bromophenol	10	20	10	20%
2,4-dibromophenol	10	20	10	20%
2,6-dibromophenol	10	20	10	20%

Note for Tartaric acid samples: Tartaric acids were added at to pH adjusted juice at approximately 10 g/L prior to fermentation. The resulting wine was then analysed as per GM102 and results expressed in ng/L.

GM118- Determination of natamycin in wine

The result is expressed in µg/L of natamycin.

Compound	LoQ (µg/L)	UoM (<20 µg/L) (±µg/L)	UoM (>20 µg/L) (±)
Natamycin	5	5	20%

Residues above 5 µg/L are reported to the nearest µg/L

GM122- Determination of smoke related compounds in wine, juice and grapes

Wine and juice

Compound	LoQ (µg/L)	UoM (<10 µg/L) (±µg/L)	UoM (>10 µg/L) (±)
guaiacol	1	1	10%
4-methylguaiacol	1	1	10%
o-cresol	1	1	10%
p-cresol	1	1	10%
m-cresol	1	1	10%
syringol	1	1	10%
methyl syringol	1	1	10%

Grapes and leaves

Compound	LoQ (µg/kg)	UoM (<10 µg/kg) (±µg/kg)	UoM (>10 µg/kg) (±µg/kg)
Guaiacol	1	1	10%
4-methylguaiacol	1	1	10%
o-cresol	1	1	10%
p-cresol	1	1	10%
m-cresol	1	1	10%
Syringol	2	1	10%
Methyl Syringol	2	1	10%

GM123- Determination of low molecular weight sulphur compounds in wine

Results above the limit of quantitation are reported to the nearest µg/L for all analytes.

Compound	LoQ (µg/L)	UoM (<50 µg/L) (±µg/L)	UoM (>50 µg/L) (±)
Hydrogen sulphide (H_2S)	0.5	5	10%
Methanethiol (methyl mercaptan)	1	5	10%
Ethanethiol (ethyl mercaptan)	1	5	10%
Dimethylsulfide (DMS)	2	5	10%
Carbon disulfide (CS_2)	0.5	5	10%
Diethylsulfide	0.5	5	10%
Methylthioacetate	5	5	10%
Dimethyldisulfide (DMDS)	0.5	5	10%
Ethylthioacetate	5	5	10%
Diethyldisulfide	0.5	5	10%

A result of '< LoQ' indicates the compound has not been determined at a level at or above the nominated LoQ above

GM124- Determination of diacetyl in wine and juice

Compound	LoQ (µg/L)	UoM (<10 mg/L) (± mg/L)	UoM (>10 mg/L) (± mg/L)
Diacetyl	0.1	1.0	10%

The result is expressed in µg/L of diacetyl.

A result of < 0.1 indicates that diacetyl was not detected at a concentration at or above the LoQ for the method.

GM125-Determination of indole in wine

Compound	LoQ (µg/L)	UoM (±)
Indole	5	10%

The result is expressed in µg/L of indole.

Residues above 5 µg/L are reported to the nearest µg/L**.**

Note: determination of indole applies to white (dry, sweet and sparkling) wines only

GM126- Extraction of rhodamine in wine

Compound	LoQ (µg/L)	UoM (<1 µg/L) (±µg/L)	UoM (>1 µg/L) (±)
Rhodamine	0.1	0.3	30%

The result is expressed in µg/L of rhodamine

A result of < 0.1 indicates that the brine marker (rhodamine) was not detected at a concentration at or above the LoQ for the method.

GM127- Determination of wine aroma compounds in wine and juice

Compound	LoQ (µg/L)	UoM (<40 µg/L) (± µg/L)	UoM (>40 µg/L) (±)
Rose oxide	10	8	20%
Linalool	10	8	20%
Nerol	10	8	20%
Geraniol	10	8	20%
α-terpineol	10	8	20%
Trimethyl dihydronaphthalene (TDN)	10	8	20%
β-damascenone	10	8	20%
β-ionone	10	8	20%

Compound	LoQ (µg/L)	UoM (<20 µg/L) (±µg/L)	UoM (>20 µg/L) (±)
Napthalene	5	4	20%

Compound	LoQ (µg/L)	UoM (<200 µg/L) (±µg/L)	UoM (>200 µg/L) (±)
Ethyl hexanoate	50	40	20%
Ethyl octanoate	50	40	20%
Ethyl decanoate	50	40	20%

Results above the LoQ are reported to the nearest µg/L.

GM138- Determination of chlorophenols in wine, juice and ethanol extracts using HS-SPME and GCMS

Compound	LoQ (µg/L)	UoM (±) (< 15 µg/L)	UoM (±) (> 15 µg/L)
2-chlorophenol	1	3	20%
4-chlorophenol	1	3	20%
2,4-chlorophenol	1	3	20%
2,6-chlorophenol	1	3	20%
2,4,6-trichlorophenol	1	2	20%
Tetrachlorophenol	1	3	20%
Pentachlorophenol	1	3	30%

Results above the limit of detection are reported to the nearest µg/L.

GM141- Determination of smoke related glycoside precursors in grapes, wine and juice

UoM for analysis of wine samples

Compound	LoQ (µg/L)	UoM (< 15 µg/L)	UoM (> 15 µg/L)
Syringol gentiobioside	1	5	30%
Cresol rutinoside	1	5	50%
Guaiacol rutinoside	1	5	40%
Methylguaiacol rutinoside	1	5	50%
Methylsyringol gentiobioside	1	5	40%
Phenol rutinoside	1	5	45%

UoM for analysis of grape and juice samples

Compound	LoQ (µg/L)	UoM (< 15 µg/L)	UoM (> 15 µg/L)
Syringol gentiobioside	1	5	20%
Cresol rutinoside	1	5	50%
Guaiacol rutinoside	1	5	30%
Methylguaiacol rutinoside	1	5	30%
Methylsyringol gentiobioside	1	5	35%
Phenol rutinoside	1	5	40%

GM154 - Determination of 1,8-cineole in wine

Compound	LoQ (µg/L)	UoM (<20 µg/L) (±µg/L)	UoM (>20 µg/L) (±)
1,8-cineole	2.0	2	10%

Dithiocarbamates

The limit of reporting for this method is 0.1 mg/L in wine. A result of '< LoQ' indicates that the analyte has not been detected at a concentration equal to or greater than the LoQ.

Total dithiocarbamates includes the summed total of mancozeb, metiram and ziram (and all other pesticides of this chemical class) determined by CS_2 analysis from an acid hydrolysis of the sample.

Phosphorus acid in wines and juice

Phosphorous acid analysis has been sub-contracted to a third party laboratory for completion.

The limit of quantitation (LoQ) for this analysis is 0.1 mg/kg. A result of '< LoQ' indicates that the analyte has not been detected at a concentration equal to or greater than the limit of quantitation for the analyte or method.

Phosphorus acid in solids

This analysis has been sub-contracted to a third party laboratory for completion.

The limit of quantitation for this method is 0.03 g/kg in DAP. A result of '< LoQ' indicates that the analyte has not been detected at a concentration equal to or greater than the LoQ.