HARMONIZING REPORTING OF REGULATORY LIMITS IN WINE ANALYSIS VIA INTERNATIONAL SYSTEM OF UNITS

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ABOUT THE INTERNATIONAL WINE TECHNICAL SUMMIT

The International Wine Technical Summit is a collaborative group of government and industry representatives who have an understanding of the technical issues surrounding wine production and trade.

The purpose of the Summit is to share best practices, and exchange ideas and experiences while fostering a collaborative environment in which to discuss:

Sound science in wine regulation and enforcement, and Trade issues of a technical or scientific nature.

ABSTRACT

This paper highlights the importance of using a harmonized system of reporting units for analytical results in wine testing to facilitate trade in the global market. It encourages wine testing laboratories engaged in wine trade to:

- Use the International System of Units (SI) of measurement and
- Standardize the format for reporting results from commonly requested wine constituent analyses when trading in wine.

INTRODUCTION

The global nature of wine trade necessitates that technical barriers are minimized through a common set of principles in relation to wine regulation. One such set of principles is the *Tbilisi Statement* adopted by the World Wine Trade Group (WWTG) in 2014, many of which are also endorsed by FIVS. *Inter alia*, the principles in the *Tbilisi Statement* provide guidance on reducing some of the technical barriers frequently encountered in wine trade due to variations in terminology and reporting for wine analytical parameters. At the 2015 International Wine Technical Summit (IWTS) (previously known as the 'International Wine Technical Forum'), participating government and industry wine technical experts established working groups to facilitate practical implementation of the *Tbilisi Statement* principles. This paper is the outcome of one Working Group's efforts, focusing on Tbilisi Principle #4 which states *"Governments should, where feasible and appropriate, adopt a common system of scientific units for expressing regulatory limits relating to wine".*

BACKGROUND

A common cause of confusion in wine trade internationally is the lack of consistency in the scientific units used to express regulatory limits and wine analytical results in relation to regulatory requirements. Although SI (Système Internationale) units are used in many laboratories performing analyses related to trade in wine, inconsistencies in reporting still exist. *Table 1* illustrates examples of wine constituents and the current scientific units of expression for reporting by country. It is clear that confusion may arise when analytical results for the same wine constituent are expressed using each country's regulatory prescriptions. In addition, between countries and within different regions within the same country, there are inconsistencies of expression of units for the same limit, whether on a weight by volume, volume by volume, percent by volume, or weight by weight basis.

These considerations led the participants at the 2015 IWTS to confirm that SI units are the most appropriate for expressing regulatory limits and for reporting results of wine analyses. The International System of Units (SI) is a system of units of measurement used internationally in the scientific and mathematical fields to provide a common way of expressing measurement information when sharing data. SI units are defined in International Standard 80000 and promulgated jointly by the International Organization for Standardization (ISO) and the

International Electrotechnical Commission (IEC), (Bureau International des Poids et Mesures, 2014)[1].

Table 2 provides an example using the wine constituent, methanol, to illustrate the complexity of the situation when different SI units are used to express the same limit. The interpretation of methanol limits will vary by country, leading to enormous potential confusion, and becoming even more complicated when some results for methanol are based on the total volume of wine and others on the content of ethanol in the wine (this issue will be discussed separately in a forthcoming paper).

TABLE 1: USE OF DIFFERENT UNITS TO EXPRESS SAME WINE CONSTITUENTS[2]

Constituent	**Unit of Expression**
Methanol	mg/L (Canada (Ontario), China, EU), mg/cm^3 (Japan) g/L (Canada (Quebec), Australia, New Zealand, Vietnam, Taiwan, Korea, India) % by volume wine (U.S.) % (Russia, unknown if by weight or volume) % calculated on alcohol (Indonesia) mg/kg (Turkey, Georgia) mg/mL (South Korea) mg/100mL (Mexico) mg/dm^3 (Georgia)
Volatile Acidity	g/L (Chile, China, Australia, New Zealand) g/100 mL (U.S., Philippines) meq/L (EU) % wt/vol (Canada, Papua New Guinea) mg/dm^3 (Georgia)
Titratable Acidity	g/L (tartaric or sulfuric) (Chile, EU) g/100 mL (tartaric) (U.S.) meq/L (Brazil)
Total Sulfur Dioxide	ppm (U.S., Canada, Hong Kong) mg/L(EU, India, Indonesia, S. Africa, Australia, New Zealand) g/L (Chile, China, Mexico)

[1] Bureau International des Poids et Mesures. (2014). SI Brochure: The International System of Units (SI) [8th edition, 2006; updated in 2014]. Retrieved from http://www.bipm.org

[2] Hodson, G. (2014). International Wine Technical Summit Presentation

	mg/dm^3 (Georgia) g/kg (Japan, S. Korea) mg/kg (Malaysia, Peru)

TABLE 2. METHANOL LEVELS BASED ON EITHER TOTAL WINE VOLUME OR ETHANOL CONTENT[3]

Country /Advisory Body	**Limit**
OIV	400 mg/L of wine (Red) 250 mg/L of wine (White)
Argentina	0.35mL/L of wine (about 280mg/L)
Australia	Domestic Production: 2g/L of ethanol (White and Sparkling), 3g/L of ethanol (other products) Imported Wines: 3g/L of ethanol
Canada (Ontario)	400mg/L of wine
Canada (Quebec)	0.4g/L (400mg/L) of wine
China	300 mg/L of wine (Red) 250 mg/L of wine (White)
Korea	2g/L of ethanol
Japan	1mg/cubic cm (about 1000mg/L) of wine
India	2g/L of ethanol
New Zealand	3g/L of ethanol
Russia	0.05% of the ethanol content
South Africa	300 mg/L of wine
Switzerland	300 mg/L of wine (Red & White) 250 mg/L of wine (Rose)
Taiwan	2g/L of ethanol
Turkey	10mg/kg (about 10mg/L) of wine
Vietnam	3g/L of ethanol

[3] Hodson, G. (2014). International Wine Technical Summit Presentation

Participants at the 2015 IWTS confirmed that they use SI units at their laboratories to report wine test results, and unanimously acknowledged that it would be beneficial if all governments engaged in regulating wine trade were to harmonize the use of scientific units when reporting regulated wine constituents. As is evident from Tables 1 and 2 above, even when SI units are used to report analytical results, there is potential for confusion. Unifying expression of regulatory limits for wine and of wine constituent analysis reporting would allow much simpler understanding of information from different countries and reduce potential trade barriers due to such differences.

POTENTIAL SOLUTION

This Working Group has evaluated the regulatory limits and analytical reporting requirements of the many wine constituents in international wine commerce and recommends that in order to facilitate international wine trade, a unified system of reporting units for wine constituents is appropriate. Appendix A (adapted from Burns & Caputi, 2002) provides guidance to laboratories on preferred usage when reporting units for wine constituents frequently required to be analyzed in international trade.

APPENDIX A. RECOMMENDED UNITS OF MEASUREMENT IN WINE ANALYSIS[4]

Analyte	**Unit of Measurement**
4-Ethylphenol	µg/L
Acetaldehyde	mg/L
Ammonia	mg/L
Arsenic	mg/L
Benzoic acid	mg/L
Calcium	mg/L
Carbon dioxide	g/L
Citric acid	g/L
Copper	mg/L
Ethanol	%v/v
Ethyl acetate	mg/L
Ethyl Carbamate	µg/L
Fluoride	mg/L
Free SO2	mg/L
Glucose + Fructose	g/L
Iron	mg/L
Lactic acid	g/L
Lead	µg/L
Magnesium	mg/L
Malic acid	g/L
Methanol	mg/L
Potassium	mg/L
Reducing sugar	g/L
Sorbic Acid	mg/L
Titratable acidity	g/L tartaric acid
Tartaric acid	g/L
Total dry extract	g/L
Total SO2	mg/L
Volatile Acidity	g/L acetic acid
Volume	mL
Zinc	mg/L

[4] Burns, G., & Caputi, A. (2002). Adoption of International Units of Measurement in United States Wine Analysis. [Technical Brief]. Am.J.Enol.Vitic.53:3, 222-223.