NWWS international wine consultants

Volatile acidity calculations

Volatile acidity (VA) can be expressed in several different ways: as g/l sulphuric acid, acetic acid, tartaric acid, or in milliequivalents. In the USA, volatile acidity is expressed in terms of acetic acid but in g/100ml rather than g/l. Converting between these is easy, but remember to state which units you are using when you report your results!

	g/l H_2SO_4	**g/l acetic acid**	**g/l tartaric acid**	**mEq/l**	**g/100ml acetic acid**
1.00 g/l H_2SO_4	1.00	1.22	1.53	20.39	0.122
1.00 g/l acetic acid	0.82	1.00	1.26	16.65	0.100
1.00 g/l tartaric acid	0.65	0.80	1.00	13.32	0.080
1.00 mEq/l	0.049	0.060	0.075	1.00	0.006

Explanation

To convert between expressions of acidity it is first necessary to calculate the "equivalent mass" of each acid.

For acids, the equivalent mass is the mass of acid that contains one mole of replaceable hydrogen.

For acetic acid, one mole of acetic acid contains one mole of replaceable hydrogen, so the equivalent mass = molecular mass of acetic acid = 60.05 g

But sulphuric acid (H_2SO_4) and tartaric acid both have two replaceable hydrogens, so for these acids:

$$Equivalent\ mass = \frac{molecular\ mass}{number\ of\ replaceable\ hydrogen} = \frac{molecular\ mass}{2}$$

The equivalent mass of sulphuric acid is therefore $\frac{98.078}{2} = 49.039\ g$

And the equivalent mass of tartaric acid is $\frac{150.087}{2} = 75.0435\ g$

To convert between expressions of acidity, multiply by the ratio of equivalent masses:

Eg. 1.00 g/l H_2SO_4 = $1.00 \times \frac{equivalent\ mass\ of\ tartaric\ acid}{equivalent\ mass\ of\ sulphuric\ acid} = \frac{75.0435}{49.039}$ = 1.53 g/l tartartic acid

Milliequivalents (mEq) are equal to equivalent mass / 1000, so 1.00 mEq = 75.0435/1000 = 0.075 g/l tartaric acid.

Limits in the EU

The maximum levels of volatile acidity in the European Union are 18 mEq/l for white and rosé wines and 20 mEq/l for red wines:

	mEq/l	g/l H_2SO_4	g/l acetic acid	g/l tartaric acid
White and rosé	18.00	0.88	1.08	1.35
Red	20.00	0.98	1.20	1.50

Limits in the USA

The maximum volatile acidity, calculated as acetic acid, is 0.14 grams per 100ml for natural red wine and 0.12 g/100ml for other wines. In the case of wine produced from juice of 28 Brix or more the limits are raised to 0.17 g/100ml for reds and 0.15 g/100ml for whites.

	mEq/l	g/l H_2SO_4	g/l acetic acid	g/l tartaric acid
White and rosé	19.98	0.98	1.20	1.50
Red	23.31	1.14	1.40	1.75
White >28 Brix	24.98	1.22	1.50	1.87
Red >28 Brix	28.31	1.39	1.70	2.12

Limits in Australia

Wine, sparkling wine and fortified wine must contain no more than 1.5g/l of volatile acidity expressed as acetic acid:

	mEq/l	g/l H_2SO_4	g/l acetic acid	g/l tartaric acid
Wine	24.98	1.22	1.50	1.87