OIV-MA-AS2-03B Total dry matter

Type IV method

1. Definition

The total dry extract or the total dry matter includes all matter that is non-volatile under specified physical conditions. These physical conditions must be such that the matter forming the extract undergoes as little alteration as possible while the test is being carried out.

The sugar free extract is the difference between the total dry extract and the total sugars. The reduced extract is the difference between the total dry extract and the total sugars in excess of 1 g/L, potassium sulfate in excess of 1 g/L, any mannitol present and any other chemical substances which may have been added to the wine.

The residual extract is the sugar free extract less the fixed acidity expressed as tartaric acid.

2. Principle

The total dry extract is calculated indirectly from the specific gravity of the must and, for wine, from the specific gravity of the alcohol-free wine.

This dry extract is expressed in terms of the quantity of sucrose which, when dissolved in water and made up to a volume of one liter, gives a solution of the same gravity as the must or the alcohol-free wine.

3. Method

3.1. Procedure

Determine the specific gravity of a must or wine.

In the case of wine, calculate the specific gravity of the "alcohol free wine" using the following formula:

$$d_r = d_v - d_a + 1.000$$

$$d_v = d\frac{20}{20} - 0.0000086a \text{ or } p_v = p_{20} - 0.0000086\ a$$

where:

- d_v = specific gravity of the wine at 20°C (corrected for volatile acidity [(1)])
- d_a= specific gravity at 20°C of a water-alcohol mixture of the same alcoholic strength as the wine obtained using the formula:

- $d_r = 1.00180 ** (r_v - r_a) + 1.000$

where :

- r_v = density of the wine at 20°C (corrected for volatile acidity [(1)])
- r_a = density at 20°C of the water alcohol mixture of the same alcoholic strength as the wine obtained from Table 1 of chapter *Alcoholic strength by volume* for a temperature of 20°C.

3.2. Calculation

Use the value for specific gravity of the alcohol free wine to obtain the total dry extract (g/L) from table I

3.3. Expression of results

The total dry extract is reported in g/L to one decimal place.

Note:

Calculate total dry extract by separately taking into account quantities of glucose and fructose (reducing sugars) and the quantity of saccharose, as follows:

Sugar-free extract = Total dry extract – reducing sugars (glucose + fructose) – saccharose

In the case that the method of analysis allows for sugar inversion, use the following formula for the calculation:

Sugar-free extract = Total dry extract – reducing sugars (glucose + fructose) - [(Sugars after inversion – Sugars before inversion) x 0,95]

Inversion refers to the process that leads to the conversion of a stereoisomer into compounds with reverse stereoisomerism. In particular, the process based on splitting sucrose into fructose and glucose, carried out by keeping acidified solutions containing sugars (100 ml solution containing sugars + 5 ml concentrated hydrochloric acid) for at least 15 min at 50°C or above in a water□bath (the water□bath is maintained at 60°C until the temperature of the solution reaches 50°C), is called *sugar inversion*. The final solution is laevo-rotatory due to the presence of fructose, while the initial solution is dextro-rotatory due to the presence of sucrose.

TABLE I

For the calculation of the total dry extract content (g/L)

Density to 2 decimal places	3rd decimal place									
	0	1	2	3	4	5	6	7	8	9
	Extract g/L									
1.00	0	2.6	5.1	7.7	10.3	12.9	15.4	18.0	20.6	23.2
1.01	25.8	28.4	31.0	33.6	36.2	38.8	41.3	43.9	46.5	49.1
1.02	51.7	54.3	56.9	59.5	62.1	64.7	67.3	69.9	72.5	75.1
1.03	77.7	80.3	82.9	85.5	88.1	90.7	93.3	95.9	98.5	101.1
1.04	103.7	106.3	109.0	111.6	114.2	116.8	119.4	122.0	124.6	127.2
1.05	129.8	132.4	135.0	137.6	140.3	142.9	145.5	148.1	150.7	153.3
1.06	155.9	158.6	161.2	163.8	166.4	169.0	171.6	174.3	176.9	179.5
1.07	182.1	184.8	.187.4	190.0	192.6	195.2	197.8	200.5	203.1	205.8
1.08	208.4	211.0	213.6	216.2	218.9	221.5	224.1	226.8	229.4	232.0
1.09	234.7	237.3	239.9	242.5	245.2	247.8	250.4	253.1	255.7	258.4
1.10	261.0	263.6	266.3	268.9	271.5	274.2	276.8	279.5	282.1	284.8
1.11	287.4	290.0	292.7	295.3	298.0	300.6	303.3	305.9	308.6	311.2
1.12	313.9	316.5	319.2	321.8	324.5	327.1	329.8	332.4	335.1	337.8
1.13	340.4	343.0	345.7	348.3	351.0	353.7	356.3	359.0	361.6	364.3
1.14	366.9	369.6	372.3	375.0	377.6	380.3	382.9	385.6	388.3	390.9
1.15	393.6	396.2	398.9	401.6	404.3	406.9	409.6	412.3	415.0	417.6

1.16	420.3	423.0	425.7	428.3	431.0	433.7	436.4	439.0	441.7	444.4
1.17	447.1	449.8	452.4	455.2	457.8	460.5	463.2	465.9	468.6	471.3
1.18	473.9	476.6	479.3	482.0	484.7	487.4	490.1	492.8	495.5	498.2
1.19	500.9	503.5	506.2	508.9	511.6	514.3	517.0	519.7	522.4	525.1
1.20	527.8	-	-	-	-	-	-	-	-	-

Interpolation table

4th decimal place	Extract g/L	4th decimal place	Extract g/L	4th decimal place	Extract g/L
1	0.3	4	1.0	7	1.8
2	0.5	5	1.3	8	2.1
3	0.8	6	1.6	9	2.3

Bibliography

- TABLE DE PLATO, d'après *Allgemeine Verwaltungsvorschrift für die Untersuchung von Wein und ähnlichen alkoholischen Erzeugnissen sowie von Fruchtsäften,* vom April 1960, Bundesanzeiger Nr. 86 vom 5. Mai 1960. Une table très voisine se trouve dans *Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists,* Ed. A.O.A.C., Washington 1945, 815.

[(1)][(1)] NOTE: Before carrying out this calculation, the specific gravity (or the density) of the wine measured as specified above should be corrected for the effect of the volatile acidity using the formula:

$d_v = d\frac{20}{20} - 0.0000086a$ or $p_v = p_{20} - 0.0000086\ a$

where *a* is the volatile acidity expressed in milli-equivalents per liter.
** The coefficient 1.0018 approximates to 1 when r*v* is below 1.05 which is often the case.

[(1)]