OIV-MA-AS2-03A Total dry matter

Type I 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 weight of residue obtained when a sample of wine, previously absorbed onto filter paper, is dried in a current of air, at a pressure of 20 □ 25 mm Hg at 70°C.

3. Method

3.1. Apparatus

3.1.1. Oven:

Cylindrical basin (internal diameter: 27 cm, height: 6 cm) made of aluminum with an aluminum lid, heated to 70°C and regulated to 1°C.

A tube (internal diameter: 25 mm) connecting the oven to a vacuum pump providing a flow rate of 50 L/h. The air, previously dried by bubbling through concentrated sulfuric acid, is circulated in the oven by a fan in order to achieve quick homogenous reheating. The rate of airflow is regulated by a tap and is to be 30□40 L per hour and the pressure in the oven is 25 mm of mercury.

The oven can then be used providing it is calibrated as in 3.1.3.

3.1.2. Dishes:

Stainless steel dishes (60 mm internal diameter, 25 mm in height) provided with fitting lids. Each dish contains 4□4.5 g of filter paper, cut into fluted strips 22 mm in length.

The filter paper is first washed with hydrochloric acid, 2 g/L, for 8 h, rinsed five times with water and then dried in air.

3.1.3. Calibration of apparatus and method

a) Checking the seal of the dish lids. A dish, containing dried filter paper, with the lid on, after first being cooled in a dessicator containing sulfuric acid, should not gain more than 1 mg/h when left in the laboratory.

b) Checking the degree of drying. A pure solution of sucrose, 100 g/L, should give a dry extract of 100 g $\pm$ 1 g/L.

c) A pure solution of lactic acid, 10 g/L, should give a dry extract of at least 9.5 g/L.

If necessary, the drying time in the oven can be increased or decreased by changing the rate of airflow to the oven or by changing the pressure in order that these conditions should be met.

Note: The lactic acid solution can be prepared as follows: 10 mL of lactic acid is diluted to approximately 100 mL with water. This solution is placed in a dish and heated on a boiling water bath for 4 h, distilled water is added if the volume decreases to less than 50 mL (approx). Make up the solution to 1 liter and titrate 10 mL of this solution with alkali, 0.1 M. Adjust the lactic acid solution to 10 g/L.

3.2. Procedure

3.2.1. Weighing the dish

Place the dish containing filter paper in the oven for 1 h. Stop the vacuum pump and immediately place the lid on the dish on opening the oven. Cool in a dessicator and weigh to the nearest 0.1 mg: the mass of the dish and lid is *po* g.

3.2.2. Weighing the sample

Place 10 mL of must or wine into the weigh dish. Allow the sample to be completely absorbed onto the filter paper. Place the dish in the oven for 2 h (or for the time used in the calibration of the standard in 3.1.3). Weigh the dish following the procedure 3.2.1 beginning "Stop the vacuum ..." The mass is *p* g.

Note: The sample weight should be taken when analyzing very sweet wines or musts.

3.3. Calculation

The total dry extract is given by:

$$(p - p_0) \times 100$$

For very sweet wines or musts the total dry extract is given by:

$$(p - p_0) \times \frac{p_{20}}{P} \times 1000$$

(**P** = mass of sample in grams

p_{20}= density of wine or must in g/mL.

3.4. *Expression of results*

The total dry extract is expressed 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

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