Method OIV-MA-AS2-01A Type I methods

Density and Specific Gravity at 20°C

1. Definition

Density is the mass per unit volume of wine or must at 20°C. It is expressed in grams per milliliter, and denoted by the symbol $\rho_{20°C}$.

Specific gravity at 20°C (or 2°C/2°C relative density) is the ratio, expressed as a decimal number, of the density of the wine or must at 20°C to the density of water at the same temperature, and is denoted by the symbol $d_{20°C}^{20°C}$

2. Principle

Density and specific gravity at 20°C are determined on the sample for testing:

A. by pycnometry, or
B. by densitometry with a hydrostatic balance.

Note: For very accurate measurement, the density and relative density must be corrected for the presence of sulfur dioxide.

ρ_{20} = ρ'_{20} - 0.0006 x S

ρ_{20} = the corrected density

ρ'_{20} = the observed density

S = total sulfur dioxide in g/L

3. Preliminary treatment of sample

If the wine or the must contains appreciable quantities of carbon dioxide, remove most of this by agitating 250 mL of wine in a 1000 mL flask, or by filtering under reduced pressure through 2 g of cotton wool placed in an extension tube.

4. Density and Specific Gravity at 20°C by pycnometry (Type I method)

4.1. *Apparatus*

Normal laboratory apparatus and in particular:

4.1.1 Pyrex glass pycnometer of approximately 100 mL capacity with a detachable ground glass thermometer graduated in tenths of a degree from 10 to 30°C. The thermometer must be standardized (fig 1).

Any pycnometer that is technically equivalent may be used.

The pycnometer has a side tube 25 mm in length and 1 mm (maximum) in internal diameter ending in a conical ground joint. The side tube may be capped by a "reservoir stopper" consisting of a conical ground-glass joint tube ending in a tapered section. The stopper serves as an expansion chamber.

The two ground joints of the apparatus should be prepared with care.

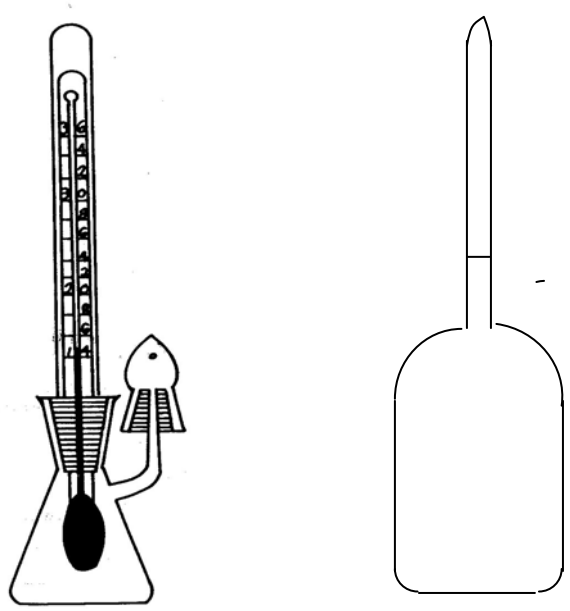

FIGURE 1: Pycnometer with tare flask

4.1.2 A tare flask of the same external volume (to within at least 1 mL) as the pycnometer and with a mass equal to the mass of the pycnometer filled with a liquid of specific gravity 1.01 (sodium chloride solution, 2% (*m/v)*).
A thermally insulated chamber exactly fitting the body of the pycnometer.

4.1.3 A two-pan balance, sensitive to one-tenth milligram, or a single-pan balance, sensitive to one-tenth of a milligram.

4.2. ***Calibration of the Pycnometer***

Calibration of the pycnometer involves determination of the following quantities:

- empty tare;
- volume of pycnometer at 20°C;
- mass of water filled pycnometer at 20°C.

4.2.1 Method using a two-pan balance

Place the tare flask on the left-hand pan of the balance and the pycnometer (clean and dry, with its "receiving stopper" fitted) on the right-hand pan, attain a balance by placing marked weights alongside the pycnometer, to give *p* grams.

Carefully fill the pycnometer with distilled water at ambient temperature. Insert the thermometer. Carefully wipe the pycnometer and place it in the thermally insulated container. Mix by inverting the container until the temperature reading on the thermometer is constant. Accurately adjust the level to the upper rim of the side tube. Wipe the side tube and put on the receiving stopper. Read temperature *t*°C with care and if necessary correct for the inaccuracy of the thermometer scale. Weigh the pycnometer full of water, against the tare and record *p'*, the mass in grams that gives an exact balance.

Calculations: *

Tare of the empty pycnometer:

Tare empty = $p + m$ m = mass of air contained in pycnometer

$$m = 0.0012\ (p - p')$$

Volume at 20°C:

$V_{20°C} = (p + m - p') \times F_t$

F_t = factor obtained from Table I for temperature *t*°C

$V_{20°C}$ must be known to the nearest ± 0.001 mL

Mass of water at 20°C:

$M_{20°C} = V_{20°C} \times 0.998203$

0.998203 = density of water at 20°C.

4.2.2 *Using a single-pan balance*

Determine:

- mass of clean dry pycnometer: P,

* A worked example is given in the Annex.

- mass of pycnometer full of water at *t*°C as described in 4.2.1: P_1
- mass of tare flask T_0.

Calculations: *

Taring of the empty pycnometer:
Tare empty pycnometer = P – *m* *m* = mass of air contained in pycnometer
$m = 0.0012 (P_1 - P)$

Volume at 20°C:
$V_{20°C} = [P_1 - (P - m)] \times F_t$
F_t = factor obtained from Table I for temperature *t*°C
$V_{20°C}$ must be known to the nearest ± 0.001 mL

Water mass at 20°C:
$M_{20°C} = V_{20°C} \times 0.998203$
0.998203 = density of water at 20°C.

4.3. **Method of measurement** *

4.3.1 Using a two-pan balance

Weigh the pycnometer filled with the sample prepared for testing (3) as described in 4.2.1.

Let *p*'' be the mass in grams that achieves a balance at *t*°C.
Mass of the liquid in the pycnometer = *p* + *m* - *p*''
Apparent density at *t*°C:

$$\rho_{t^oC} = \frac{p + m - p''}{V_{20^oC}}$$

Calculate the density at 20°C using the appropriate correction table in accordance with the nature of the liquid being measured: dry wine (Table II), natural or concentrated must (Table III), sweet wine (Table IV).

The 20°C/20°C specific gravity of the wine is calculated by dividing the density at 20°C by 0.998203.

4.3.2 Using a single-pan balance *

Weigh the tare flask, let its mass be T_1;

Calculate $dT = T_1 - T_0$.

Mass of pycnometer empty at time of measurement = P - *m* + *d*T.

* A worked example is given in the Annex.

Weigh the pycnometer filled with the sample prepared for the test as described in 4.2.1. Let its mass at *t*°C be P_2
Mass of the liquid in the pycnometer at *t*°C = P_2 - (P - *m* + *d*T).
Apparent density at *t*°C:

$$\rho_{t°C} = \frac{P_2 - (P - m + dT)}{V_{20°C}}$$

Calculate the density at 20°C of the liquid examined (dry wine, natural or concentrated must or sweet wine) using the correction tables as instructed in 4.3.1.

The 20°C/20°C specific gravity is obtained by dividing the density at 20°C by 0.998203.

4.3.3 *Repeatability* for density measurements
of dry and full bodied wines: $r = 0.00010$
of sweet wines: $r = 0.00018$

4.3.4 *Reproducibility* for density measurements
of dry and full bodied wines: $R = 0.00037$
of sweet wines: $R = 0.00045$

5. Density and Specific Gravity at 20°C with a hydrostatic balance (Type I method)

5.1.1 *Apparatus*

5.1.1.1 Hydrostatic balance

Hydrostatic balance, with maximum capacity of at least 100 g, and a sensitivity of 0.1 mg.

Identical Pyrex-glass floats of at least 20 mL volume are attached under each pan by a thread of diameter no greater than 0.1 mm.

The float suspended under the right-hand pan must be capable of being introduced into a measuring cylinder bearing a mark indicating the level. The measuring cylinder must have an internal diameter at least 6 mm greater than that of the float. The float must be capable of being contained completely within the volume of the measuring cylinder located below the mark: the surface of the liquid to be measured must be penetrated only by the supporting thread. The temperature of the liquid in the measuring cylinder is measured with a thermometer graduated in steps of 0.2°C.

A single-pan hydrostatic balance may also be used.

5.1.2 Procedure

5.1.2.1 Calibrating a hydrostatic balance

With both floats in the air, achieve a balance by putting weights on the right-hand pan. Record the mass of the weights *p*.

Fill the measuring cylinder with pure water to the reference mark, read the temperature *t*°C after shaking and allowing to stand for two or three minutes. Restore the balance with weights placed on the right-hand pan, mass of these weights is *p'*.

Volume of the float at 20°C:

$$V_{20°C} = (p' - p)\,(F + 0.0012)$$

F = factor given in Table I for the temperature *t*°C.

p and $V_{20°C}$ are the characteristics of the float.

5.1.2.2 Method of measurement

The right-hand float is immersed into the measuring cylinder filled with wine (or must) to the mark. Record the temperature *t*°C of the wine (or must), and mass, *p*", to restore the balance.

Calculate the apparent density, $p_{t°C}$:

$$\rho_{t°C} = \frac{(\rho'' - \rho)}{V_{20°C}} + 0{,}0012$$

Correct this density to 20°C by using Table II, III or IV (if the float is Pyrex glass) or Table V, VI or VII (if it is ordinary glass).

ANNEX I

(worked example)

I. Pycnometry with twin-pan balance

A/ Standardization of the pycnometer

1. Weigh a clean and dry pycnometer:
   Tare = pycnometer + p
   p= 104.9454 g
2. Weigh pycnometer filled with water at temperature t°C:
   Tare = pycnometer + water + p'
   p' = 1.2396 g at t = 20.5°C
3. Calculate mass of air within the pycnometer:
   $m = 0.0012\ (p - p')$
   $m = 0.0012\ (104.9454 - 1.2396)$
   $m = 0.1244$
4. Values to record:
   Tare of empty pycnometer: $p + m$
   $p + m = 104.9454 + 0.1244$
   $p + m = 105.0698$ g

   Volume at 20°C = $(p + m - p') \times F_{t°C}$
   $F_{20.50°C} = 1.001900$
   $V_{20°C} = (105.0698 - 1.2396) \times 1.001900$
   $V_{20°C} = 104.0275$ mL

   Mass of water at 20°C = $V_{20°C} \times 0.998203$
   $M_{20°C} = 103.8405$ g

B/. Determination of density at 20°C and 20°C/20°C density for dry wine:

p'' = 1.2622 at 17.80°C

$$\rho_{17.80°C} = \frac{105.0698 - 1.2622}{104.0275}$$

$$\rho_{17.80°C} = 0.99788$$

$p_{20°C}$ can be calculated from $\rho_{t°C}$ using Table II and the equation:

$$\rho_{20°C} = \rho_{t°C} \pm \frac{c}{1000}$$

At t = 17.80°C and for an alcoholic strength of 11% vol., c = 0.54:

$$\rho_{20°C} = 0.99788 \pm \frac{0.54}{1000}$$

$$\rho_{20°C} = 0.99734\ \text{g/mL}$$

$$d^{20°C}_{20°C} = \frac{0.99734}{0.998203} + 0.99913$$

II. Pycnometry with single-pan balance

A/ Standardization of the pycnometer

1. Mass of clean and dry pycnometer:
   P = 67.7913 g
2. Mass pycnometer filled with water at temperature *t*°C:
   P_1 = 169.2715g at 21.65°C
3. Calculate mass of air within the pycnometer:
   m = 0.0012 (P_1 - P)
   m = 0.0012 x 101.4802
   m = 0.1218g
4. Values to record:
   Tare of empty pycnometer: P - *m*
   P - *m* = 67.7913 - 0.1218
   P - *m* = 67.6695 g
   Volume at 20°C = [P_1 - (P - *m*)] x $F_{t°C}$
   $F_{21.65°C}$ = 1.002140
   $V_{20°C}$ = (169.2715 - 67.6695) x 1.002140
   $V_{20°C}$ = 101.8194 mL

Mass of water at 20°C = $V_{20°C}$ x 0.998203
$M_{20°C}$ = 101.6364 g
Mass of tare flask: T_0
T_0 = 171.9160 g

B/ *Determination of density at 20°C and 20°C/20°C specific gravity for a dry wine:*

T_1 = 171.9178
*d*T = 171.9178 - 171.9160 = +0.0018 g
P - *m* + *d*T = 67.6695 + 0.0018 = 67.6713 g
P_2 = 169.2799 at 18°C

$$\rho_{18°C} = \frac{169.2799 - 67.6713}{101.8194}$$

$\rho_{18°C}$ = 0.99793 g/mL

$\rho_{20°C}$ can be calculated from $\rho_{t°C}$ using Table II and the equation:

$$\rho_{20°C} = \rho_{t°C} \pm \frac{c}{1000}$$

For *t* = 18°C and an alcoholic strength of 11% vol., *c* = 0.49:

$$\rho_{20°C} = 0.99793 - \frac{0.49}{1000}$$

$\rho_{20°C}$ = 0.99744 g/mL

$$d^{20°C}_{20°C} = \frac{0.99744}{0.998203} = 0.99923$$

ANNEX II
Tables

TABLE I

F Factors
by which the mass of the water in the *Pyrex pycnometer* at *t*°C has to be multiplied to calculate the volume of the pycnometer at 20°C.

t °C	F	*t* °C	F	*t* °C	F	*t* °C	F	*t* °C	F	*t* °C	F	*t* °C	F
10.0	1.000398	13.0	1.000691	16.0	1.001097	19.0	1.001608	22.0	1.002215	25.0	1.002916	28.0	1.003704
.1	1.000406	.1	1.000703	.1	1.001113	.1	1.001627	.1	1.002238	.1	1.002941	.1	1.003731
.2	1.000414	.2	1.000714	.2	1.001128	.2	1.001646	.2	1.002260	.2	1.002966	.2	1.003759
.3	1.000422	.3	1.000726	.3	1.001144	.3	1.001665	.3	1.002282	.3	1.002990	.3	1.003797
.4	1.000430	.4	1.000738	.4	1.001159	.4	1.001684	.4	1.002304	.4	1.003015	.4	1.003815
10.5	1.000439	13.5	1.000752	16.5	1.001175	19.5	1.001703	22.5	1.002326	25.5	1.003041	28.5	1.003843
.6	1.000447	.6	1.000764	.6	1.001191	.6	1.001722	.6	1.002349	.6	1.003066	.6	1.003871
.7	1.000456	.7	1.000777	.7	1.001207	.7	1.001741	.7	1.002372	3	1.003092	.7	1.003899
.8	1.000465	.8	1.000789	.8	1.001223	.8	1.001761	.8	1.002394	.8	1.003117	.8	1.003928
.9	1.000474	.9	1.000803	.9	1.001239	9	1.001780	.9	1.002417	.9	1.003143	.9	1.003956
11.0	1.000483	14.0	1.000816	17.0	1.001257	20.0	1.001800	23.0	1.002439	26.0	1.003168	29.0	1.003984
.1	1.000492	.1	1.000829	.1	1.001273	.1	1.001819	.1	1.002462	.1	1.003194	.1	1.004013
.2	1.000501	.2	1.000842	.2	1.001286	.2	1.001839	.2	1.002485	1	1.003222	2	1.004042
3	1.000511	3	1.000855	3	1.001306	.3	1.001959	.3	1.002508	.3	1.003247	.3	1.004071
.4	1.000520	.4	1.000868	.4	1.001323	.4	1.001880	.4	1.002531	.4	1.003273	.4	1.004099
11.5	1.000530	14.5	1.000882	17.5	1.001340	20.5	1.001900	23.5	1.002555	26.5	1.003299	29.5	1.004128
.6	1.000540	.6	1.000895	.6	1.001357	.6	1.001920	.6	1.002578	.6	1.003326	.6	1.004158
.7	1.000550	.7	1.000909	.7	1.001374	.7	1.001941	3	1.002602	.7	1.003352	.7	1.004187
.8	1.000560	.8	1.000923	.8	1.001391	.8	1.001961	.8	1.002625	.8	1.003337	. 8	1.004216
.9	1.000570	.9	1.000937	.9	1.001409	.9	1.001982	.9	1.002649	.9	1.003405	.9	1.004245
12.0	1.000580	15.0	1.000951	18.0	1.001427	21.0	1.002002	24.0	1.002672	27.0	1.003432	30.0	1.004275
.1	1.000591	.1	1.000965	.1	1.001445	.1	1.002023	.1	1.002696	.1	1.003459		
.2	1.000601	.2	1.000979	.2	1.001462	.2	1.002044	.2	1.002720	.2	1.003485		
.3	1.000612	.3	1.000993	.3	1.001480	.3	1.002065	.3	1.002745	.3	1.003513		
.4	1.000623	.4	1.001008	.4	1.001498	.4	1.002086	.4	1.002769	.4	1.003540		
12.5	1.000634	15.5	1.001022	18.5	1.001516	21.5	1.002107	24.5	1.002793	27.5	1.003567		
.6	1.000645	.6	1.001037	.6	1.001534	.6	1.002129	.6	1.002817	.6	1.003594		
.7	1.000656	.7	1.0010 2	.7	1.001552	.7	1.002151	.7	1.002842	.7	1.003621		
.8	1.000668	.8	1.001067	.8	1.001570	.8	1.002172	.8	1.002866	.8	1.003649		
.9	1.000679	.9	1.001082	.9	1.001589	.9	1.002194	.9	1.002891	.9	1.003676		

Table II

Temperature corrections *c*, required for the density of dry wines and dry alcohol free wines, measured in a *Pyrex-glass* pycnometer at *t*°C, in order to correct to 20°C

$$\rho_{20} = \rho_t \pm \frac{c}{1000} \quad \begin{matrix} - \text{ si } t^o \text{ est inférieure à 20 °C} \\ + \text{ si } t^o \text{ est supérieure à 20 °C} \end{matrix}$$

Temperatures in °C	Alcoholic strength																					
	0	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
10°	1,59	1,64	1,67	1,71	1,77	1,84	1,91	2,01	2,11	2,22	2,34	2,46	2,60	2,73	2,88	3,03	3,19	3,35	3,52	3,70	3,87	4,06	4,25	4,44
11°	1,48	1,53	1,56	1,60	1,64	1,70	1,77	1,86	1,95	2,05	2,16	2,27	2,38	2,51	2,63	2,77	2,91	3,06	3,21	3,36	3,53	3,69	3,86	4,03
12°	1,36	1,40	1,43	1,46	1,50	1,56	1,62	1,69	1,78	1,86	1,96	2,05	2,16	2,27	2,38	2,50	2,62	2,75	2,88	3,02	3,16	3,31	3,46	3,61
13°	1,22	1,26	1,28	1,32	1,35	1,40	1,45	1,52	1,59	1,67	1,75	1,83	1,92	2,01	2,11	2,22	2,32	2,44	2,55	2,67	2,79	2,92	3,05	3,18
14°	1,08	1,11	1,13	1,16	1,19	1,23	1,27	1,33	1,39	1,46	1,52	1,60	1,67	1,75	1,94	1,93	2,03	2,11	2,21	2,31	2,42	2,52	2,63	2,74,
15°	0,92	0,96	0,97	0,99	1,02	1,05	1,09	1,13	1,19	1,24	1,30	1,36	1,42	1,48	1,55	1,63	1,70	1,78	1,86	1,95	2,03	2,12	2,21	2,30
16°	0,76	0,79	0,80	0,81	0,94	0,86	0,89	0,93	0,97	1,01	1,06	1,10	1,16	1,21	1,26	1,32	1,38	1,44	1,51	1,57	1,64	1,71	1,78	1,85
17°	0,59	0,61	0,62	0,63	0,65	0,67	0,69	0,72	0,75	0,78	0,81	0,85	0,88	0,95	0,96	1,01	1,05	1,11	1,15	1,20	1,25	1,30	1,35	1,40
18°	0,40	0,42	0,42	0,43	0,44	0,46	0,47	0,49	0,51	0,53	0,55	0,57	0,60	0,63	0,65	0,68	0,71	0,74	0,77	0,81	0,84	0,87	0,91	0,94
19°	0,21	0,21	0,22	0,22	0,23	0,23	0,24	0,25	0,26	0,27	0,28	0,29	0,30	0,32	0,33	0,34	0,36	0,37	0,39	0,41	0,42	0,44	0,46	0,47
20°																								
21°	0,21	0,22	0,22	0,23	0,23	0,24	0,25	0,26	0,27	0,28	0,29	0,30	0,31	0,32	0,34	0,36	0,37	0,38	0,40	0,41	0,43	0,44	0,46	0,48
22°	0,44	0,45	0,46	0,47	0,48	0,49	0,51	0,52	0,54	0,56	0,59	0,61	0,63	0,66	0,69	0,71	0,74	0,77	0,80	0,83	0,87	0,90	0,93	0,97
23°	0,68	0,70	0,71	0,72	0,74	0,76	0,78	0,80	0,83	0,86	0,90	0,93	0,96	1,00	1,03	1,08	1,13	1,17	1,22	1,26	1,31	1,37	1,41	1,46
24°	0,93	0,96	0,97	0,99	1,01	1,03	1,06	1,10	1,13	1,18	1,22	1,26	1,31	1,36	1,41	1,47	1,52	1,58	1,64	1,71	1,77	1,84	1,90	1,97
25°	1,19	1,23	1,25	1,27	1,29	1,32	1,36	1,40	1,45	1,50	1,55	1,61	1,67	1,73	1,80	1,86	1,93	2,00	2,08	2,16	2,24	2,32	2,40	2,48
26°	1,47	1,51	1,53	1,56	1,59	1,62	1,67	1,72	1,77	1,83	1,90	1,96	2,03	2,11	2,19	2,27	2,35	2,44	2,53	2,62	2,72	2,81	2,91	3,01
27°	1,75	1,80	1,82	1,85	1,89	1,93	1,98	2,04	2,11	2,18	2,25	2,33	2,41	2,50	2,59	2,68	2,78	2,88	2,98	3,09	3,20	3,31	3,42	3,33
28°	2,04	2,10	2,13	2,16	2,20	2,25	2,31	2,38	2,45	2,53	2,62	2,70	2,80	2,89	3,00	3,10	3,21	3,32	3,45	3,57	3,69	3,82	3,94	4,07
29°	2,34	2,41	2,44	2,48	2,53	2,58	2,65	2,72	2,81	2,89	2,99	3,09	3,19	3,30	3,42	3,53	3,65	3,78	3,92	4,05	4,19	4,33	4,47	4,61
30°	2,66	2,73	2,77	2,81	2,86	2,92	3,00	3,08	3,17	3,27	3,37	3,48	3,59	3,72	3,84	3,97	4,11	4,25	4,40	4,55	4,70	4,85	4,92	5,17

Note: This table can be used to convert d^{t}_{20} to d^{20}_{20}

Table III

Temperature corrections *c* required for the density of natural or concentrated musts as measured in a *Pyrex-glass* pycnometer at *t* °C to correct to 20°C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000}$$ - if t^o is less than 20 °C
+ if t^o is more than 20°C

	Density																				
Temperatures in °C	1,05	1,06	1,07	1,08	1,09	1,10	1,11	1,12	1,13	1,14	1,15	1,16	1,18	1,20	1,22	1,24	1,26	1,28	1,30	1,32	1,34	1,36
10°	2,31	2,48	2,66	2,82	2,99	3,13	3,30	3,44	3,59	3,73	3,88	4,01	4,28	4,52	4,76	4,98	5,18	5,42	5,56	5,73	5,90	6,05
11°	2,12	2,28	2,42	2,57	2,72	2,86	2,99	3,12	3,25	3,37	3,50	3,62	3,85	4,08	4,29	4148	4,67	4,84	5,00	5,16	5,31	5,45
12°	1,92	2,06	2,19	2,32	2,45	2,58	2,70	2,92	2,94	3,04	3,15	3,26	3,47	3,67	3,85	4,03	4,20	4,36	4,51	4,65	478	4,91
13°	1,72	1,84	1,95	2,06	2,17	2,27	2,38	2,48	2,58	2,69	2,78	2,89	3,05	3,22	3,39	3,55	3,65	3,84	3,98	4,11	4:24	4,36
14°	1,52	1,62	1,72	1,81	1,90	2,00	2,09	2,17	2,26	2,34	2,43	2,51	2,66	2,82	2,96	3,09	3,22	3,34	3,45	3,56	3,67	3,76
15°	1,28	1,36	1,44	1,52	1,60	1,67	1,75	1,82	1,89	1,96	2,04	2,11	2,24	2,36	2,48	2,59	2,69	2,79	2,88	2,97	3,03	3,10
16°	1,05	1,12	1,18	1,25	1,31	1,37	1,43	1,49	1,55	1,60	1,66	1,71	1,81	1,90	2,00	2,08	2,16	2,24	2,30	2,37	2,43	2,49
17°	0,80	0,86	0,90	0,95	1,00	1,04	1,09	1,13	1,18	1,22	1,26	1,30	1,37	1,44	1,51	1,57	1,62	1,68	1,72	1,76	1,80	1,84
18°	0,56	0,59	0,62	0,66	0,68	0,72	0,75	0,77	0,80	0,83	0,85	0,88	0,93	0,98	1,02	1,05	1,09	1,12	1,16	1,19	1,21	1,24
19°	0,29	0,31	0,32	0,34	0,36	0,37	0,39	0,40	0,42	0,43	0,44	0,45	0,48	0,50	0,52	0,54	0,56	0,57	0,59	0,60	0,61	0:62
20°																						
21°	0,29	0,30	0,32	0,34	0,35	0,37	0,38	0,40	0,41	0,42	0,44	0,46	0,48	0,50	0,53	0,56	0,58	0,59	0,60	0,61	0,62	0,62
22°	0,58	0,61	0,64	0,67	0,70	0,73	0,76	0,79	0,81	0,84	0,87	0,90	0,96	1,03	1,05	1,09	1,12	1,15	1,18	1,20	1,22	1,23
23°	0,89	0,94	0,99	1,03	1,08	1,12	1,16	1,20	1,25	1,29	1,33	1,37	1,44	1,51	1,57	1,63	1,67	1,73	1,77	1,80	1,82	1,94
24°	1,20	1,25	1,31	1,37	1,43	1,49	1,54	1,60	1,66	1,71	1,77	1,82	1,92	2,01	2,10	2,17	2,24	2,30	2,36	2,40	2,42	2,44
25°	1,51	1,59	1,66	1,74	1,81	1,88	1,95	2,02	2,09	2,16	2,23	2,30	2,42	2,53	2,63	2,72	2,82	2,89	2,95	2,99	3,01	3,05
26°	1,84	1,92	2,01	2,10	2,18	2,26	2,34	2,42	2,50	2,58	2,65	2,73	2,87	3,00	3,13	3,25	3,36	3,47	3,57	3,65	372	3,79
27°	2,17	2,26	2,36	2,46	2,56	2,66	2,75	2,84	2,93	3,01	3,10	3,18	3,35	3,50	3,66	3,80	3,93	4,06	4,16	4,26	4:35	4,42
28°	2,50	2,62	2,74	2,85	2,96	3,07	3,18	3,28	3,40	3,50	3,60	3,69	3,87	4,04	4,21	4,36	4,50	4,64	4,75	4,86	4,94	5,00
29°	2,86	2,98	3,10	3,22	3,35	3,47	3,59	3,70	3,82	3,93	4,03	4,14	4,34	4,53	4,72	4,89	5,05	5,20	5,34	5,46	5,56	5,64
30°	3,20	3,35	3,49	3,64	3,77	3,91	4,05	4,17	4,30	4,43	4,55	4,67	4,90	5,12	5,39	5,51	5,68	5,94	5,96	6,09	6,16	6,22

Note: This table can be used to convert d^t_{20} to d^{20}_{20}

TABLE IV

Temperature corrections *c* required for the density of dessert wines measured in a *Pyrex-glass* pycnometer at t °C_t to correct to 20 °C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000} \qquad \begin{array}{l} - \text{ if } t^{o} \text{ is less than 20 °C} \\ + \text{ if } t^{o} \text{ is more than 20 °C} \end{array}$$

13% vol. wine

Temperatures in °C	Density 1,000	1,020	1,040	1,060	1,080	1,100	1,120
10°	2,36	2,71	3,06	3,42	3,72	3,96	4,32
11°	2,17	2,49	2,80	2,99	3,39	3,65	3,90
12°	1,97	2,25	2,53	2,79	3,05	3,29	3,52
13°	1,78	2,02	2,25	2,47	2,69	2,89	3,09
14°	1,57	1,78	1,98	2,16	2,35	2,53	2,70
15°	1,32	1,49	1,66	1,82	1,97	2,12	2,26
16°	1,08	1,22	1,36	1,48	1,61	1,73	1,84
17°	0,83	0,94	1,04	1,13	1,22	1,31	1,40
18°	0,58	0,64	0,71	0,78	0,84	0,89	0,95
19°	0,30	0,34	0,37	0,40	0,43	0,46	0,49
20°							
21°	0,30	0,33	0,36	0,40	0,43	0,46	0,49
22°	0,60	0,67	0,73	0,80	0,85	0,91	0,98
23°	0,93	1,02	1,12	1,22	1,30	1,39	1,49
24°	1,27	1,39	1,50	1,61	1,74	1,84	1,95
25°	1,61	1,75	1,90	2,05	2,19	2,33	2,47
26°	1,94	2,12	2,29	2,47	2,63	2,79	2,95
27°	2,30	2,51	2,70	2,90	3,09	3,27	3,44
28°	2,66	2,90	3,13	3,35	3,57	3,86	4,00
29°	3,05	3,31	3,56	3,79	4,04	4,27	4,49
30°	3,44	3,70	3,99	4,28	4,54	4,80	5,06

15% vol. wine

Temperatures in °C	Density 1,000	1,020	1,040	1,060	1,080	1,100	1,120
10°	2,64	2,99	3,36	3,68	3,99	4,30	4,59
11°	2,42	2,73	3,05	3,34	3,63	3,89	4,15
12°	2,19	2,47	2,75	3,01	3,27	3,51	3,73
13°	1,97	2,21	2,44	2,66	2,87	3,08	3,29
14°	1,74	1,94	2,14	2,32	2,52	2,69	2,86
15°	1,46	1,63	1,79	1,95	2,10	2,25	2,39
16°	1,18	1,32	1,46	1,59	1,71	1,83	1,94
17°	0,91	1,02	1,12	1,21	1,30	1,39	1,48
18°	0,63	0,69	0,76	0,83	0,89	0,94	1,00
19°	0,33	0,37	0,40	0,43	0,46	0,49	0,52
20°							
21°	0,33	0,36	0,39	0,43	0,46	0,49	0,51
22°	0,65	0,72	0,78	0,84	0,90	0,96	1,01
23°	1,01	1,10	1,20	1,29	1,38	1,46	1,55
24°	1,37	1,49	1,59	1,72	1,84	1,95	2,06
25°	1,73	1,87	2,02	2,17	2,31	2,45	2,59
26°	2,09	2,27	2,44	2,62	2,78	2,94	3,10
27°	2,48	2,68	2,87	3,07	3,27	3,45	3,62
28°	2,86	3,10	3,23	3,55	3,77	3,99	4,20
29°	3,28	3,53	3,77	4,02	4,26	4,49	4,71
30°	3,68	3,94	4,23	4,52	4,79	5,05	5,30

17% vol. wine

Temperatures in °C	Density 1,000	1,020	1,040	1,060	1,080	1,100	1,120
10°	2,94	3,29	3,64	3,98	4,29	4,60	4,89
11°	2,69	3,00	3,32	3,61	3,90	4,16	4,41
12°	2,42	2,70	2,98	3,24	3,50	3,74	3,96
13°	2,18	2,42	2,64	2,87	3,08	3,29	3,49
14°	1,91	2,11	2,31	2,50	2,69	2,86	3,03
15°	1,60	1,77	1,93	2,09	2,24	2,39	2,53
16°	1,30	1,44	1,58	1,71	1,83	1,95	2,06
17°	1,00	1,10	1,20	1,30	1,39	1,48	1,56
18°	0,69	0,75	0,82	0,89	0,95	1,00	1,06
19°	0,36	0,39	0,42	0,46	0,49	0,52	0,54
20°							
21°	0,35	0,39	0,42	0,45	0,48	0,51	0,54
22°	0,71	0,78	0,84	0,90	0,96	1,01	1,07
23°	1,10	1,19	1,29	1,38	1,46	1,55	1,63
24°	1,48	1,60	1,71	1,83	1,95	2,06	2,17
25°	1,87	2,01	2,16	2,31	2,45	2,59	2,73
26°	2,26	2,44	2,61	2,79	2,95	3,11	3,26
27°	2,67	2,88	3,07	3,27	3,46	3,64	3,81
28°	3,08	3,31	3,55	3,76	3,99	4,21	4,41
29°	3,52	3,77	4,01	4,26	4,50	4,73	4,95
30°	3,95	4,22	4,51	4,79	5,07	5,32	5,57

TABLE IV (continued)
Temperature corrections *c* required for the density of dessert wines measured in a *Pyrex-glass* pycnometer at *t* °C$_t$ to correct to 20 °C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000}$$

- I f t^o is less than 20 °C
+ if t^o is more than 20 °C

		19% vol. wine							21% vol. wine						
		Density							Density						
		1,000	1,020	1,040	1,060	1,000	1,100	1,120	1,000	1,020	1,040	1,060	1,080	1,100	1,120
Temperatures in °C	10°	3,27	3,62	3,97	4,30	4,62	4,92	5,21	3,62	3,97	4,32	4,66	4,97	5,27	5,56
	11°	2,99	3,30	3,61	3,90	4,19	4,45	4,70	3,28	3,61	3,92	4,22	4,50	4,76	5,01
	12°	2,68	2,96	3,24	3,50	3,76	4,00	4,21	2,96	3,24	3,52	3,78	4,03	4,27	4,49
	13°	2,68	2,96	3,24	3,50	3,76	4,00	4,21	2,96	3,24	3,52	3,78	4,03	4,27	4,49
	14°	2,11	2,31	2,51	2,69	2,88	3,05	3,22	2,31	2,51	2,71	2,89	3,08	3,25	3,43
	15°	1,76	1,93	2,09	2,25	2,40	2,55	2,69	1,93	2,10	2,26	2,42	2,57	2,72	2,86
	16°	1,43	1,57	1,70	1,83	1,95	2,08	2,18	1,56	1,70	1,84	1,97	2,09	2,21	2,32
	17°	1,09	1,20	1,30	1,39	1,48	1,57	1,65	1,20	1,31	1,41	1,50	1,59	1,68	1,77
	18°	0,76	0,82	0,88	0,95	1,01	1,06	1,12	0,82	0,88	0,95	1,01	1,08	1,13	1,18
	19°	0,39	0,42	0,45	0,49	0,52	0,55	0,57	0,42	0,46	0,49	0,52	0,55	0,58	0,61
	20°														
	21°	0,38	0,42	0,45	0,48	0,51	0,54	0,57	0,41	0,45	0,48	0,51	0,54	0,57	0,60
	22°	0,78	0,84	0,90	0,96	1,02	1,07	1,13	0,84	0,90	0,96	1,02	1,08	1,14	1,19
	23°	1,19	1,28	1,38	1,47	1,55	1,64	1,72	1,29	1,39	1,48	1,57	1,65	1,74	1,82
	24°	1,60	1,72	1,83	1,95	2,06	2,18	2,29	1,73	1,85	1,96	2,08	2,19	2,31	2,42
	25°	2,02	2,16	2,31	2,46	2,60	2,74	2,88	2,18	2,32	2,47	2,62	2,76	2,90	3,04
	26°	2,44	2,62	2,79	2,96	3,12	3,28	3,43	2,53	2,81	2,97	3,15	3,31	3,47	3,62
	27°	2,88	3,08	3,27	3,42	3,66	3,84	4,01	3,10	3,30	3,47	3,69	3,88	4,06	4,23
	28°	3,31	3,54	3,78	4,00	4,22	4,44	4,64	3,56	3,79	4,03	4,25	4,47	4,69	4,89
	29°	3,78	4,03	4,27	4,52	4,76	4,99	5,21	4,06	4,31	4,55	4,80	5,04	5,27	5,48
	30°	4,24	4,51	4,80	5,08	5,36	5,61	5,86	4,54	4,82	5,11	5,39	5,66	5,91	6,16

Table V

Temperature corrections *c* for the density of dry wines and dry wines with alcohol removed, measured with an *ordinary- glass* pycnometer or hydrometer at t °C, to correct to 20°C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000}$$

- if t^o is less than 20 °C
+ if t^o is more than 20 °C

		Alcoholic strength																						
		0	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Temperatures in °C	10°	1,45	1,51	1,55	1,58	1,64	1,76	1,78	1,89	1,98	2,09	2,21	2,34	2,47	2,60	2,15	2,93	3,06	3,22	3,39	3,57	3,75	3,93	4,12	4,31
	11°	1,35	1,40	1,43	1,47	1,52	1,58	1,65	1,73	183	1,93	2,03	2,15	2,26	2,38	2,51	2,65	2,78	2,93	3,08	3,24	3,40	3,57	3,73	3,90
	12°	1,24	1,28	1,31	1,34	1,39	1,44	1,50	1,58	1,66	1,75	1,84	1,94	2,04	2,15	2,26	2,38	2,51	2,63	2,77	2,91	3,05	3,19	3,34	3,49
	13°	1,12	1,16	1,18	1,21	1,25	1,30	1,35	1,42	1,49	1,56	1,64	1,73	1,82	1,91	2,01	2,11	2,22	2,33	2,45	2,57	2,69	2,81	2,95	3,07
	14°	0,99	1,03	1,05	1,07	1,11	1,14	1,19	1,24	1,31	1,37	1,44	1,52	1,59	1,67	1,75	1,84	1,93	2,03	2,13	2,23	2,33	2,44	2,55	2,66
	15°	0,86	0,89	0,90	0,92	0,95	0,98	1,02	1,07	1,12	1,17	1,23	1,29	1,35	1,42	1,49	1,56	1,63	1,71	1,80	1,88	1,96	2,05	2,14	2,23
	16°	0,71	0,73	0,74	0,76	0,78	0,81	0,84	0,87	0,91	0,95	0,99	1,05	1,10	1,15	1,21	1,27	1,33	1,39	1,45	1,52	1,59	1,66	1,73	1,80
	17°	0,55	0,57	0,57	0,59	0,60	0,62	0,65	0,67	0,70	0,74	0,77	0,81	0,84	0,88	0,92	0,96	1,01	1,05	1,10	1,15	1,20	1,26	1,31	1,36
	18°	0,38	0,39	0,39	0,40	0,41	0,43	0,44	0,46	0,48	0,50	0,52	0,55	0,57	0,60	0,62	0,65	0,68	0,71	0,74	0,78	0,81	0,85	0,88	0,91
	19°	0,19	0,20	0,20	0,21	0,21	0,22	0,23	0,24	0,25	0,26	0,27	0,28	0,29	0,30	0,32	0,33	0,34	0,36	0,38	0,39	0,41	0,43	0,44	0,46
	20°																								
	21°	0,21	0,22	0,22	0,23	0,23	0,24	0,25	0,25	0,26	0,27	0,28	0,29	0,31	0,32	0,34	0,35	0,36	0,38	0,39	0,41	0,43	0,44	0,46	0,48
	22°	0,43	0,45	0,45	0,46	0,47	0,49	0,50	0,52	0,54	0,56	0,58	0,60	0,62	0,65	0,68	0,71	0,73	0,77	0,80	0,83	0,86	0,89	0,93	0,96
	23°	0,67	0,69	0,70	0,71	0,72	0,74	0,77	0,79	0,82	0,85	0,88	0,91	0,95	0,99	1,03	1,07	1,12	1,16	1,21	1,25	1,30	1,35	1,40	1,45
	24°	0,91	0,93	0,95	0,97	0,99	1,01	1,04	1,07	1,11	1,15	1,20	1,24	1,29	1,34	1,39	1,45	1,50	1,56	1,62	1,69	1,76	1,82	1,88	1,95
	25°	1,16	1,19	1,21	1,23	1,26	1,29	1,33	1,37	1,42	1,47	1,52	1,57	1,63	1,70	1,76	1,83	1,90	1,97	2,05	2,13	2,21	2,29	2,37	2,45
	26°	1,42	1,46	1,49	1,51	1,54	1,58	1,62	1,67	1,73	1,79	1,85	1,92	1,99	2,07	2,14	2,22	2,31	2,40	2,49	2,58	2,67	2,77	2,86	2,96
	27°	1,69	1,74	1,77	1,80	1,83	1,88	1,93	1,98	2,05	2,12	2,20	2,27	2,35	2,44	2,53	2,63	2 72	2,82	2,93	3,04	3,14	3,25	3,37	3,48
	28°	1,97	2,03	2,06	2,09	2,14	2,19	2,24	2,31	2,38	2,46	2,55	2,63	2,73	2,83	2,93	3,03	3,14	3,26	3,38	3,50	3,62	3,75	3,85	4,00
	29°	2,26	2,33	2,37	2,41	2,45	2,50	2,57	2,64	2,73	2,82	2,91	2,99	3,11	3,22	3,34	3,46	3,58	3,70	3,84	3,97	4,11	4,25	4,39	4,54
	30°	2,56	2,64	2,67	2,72	2,77	2,83	2,90	2,98	3,08	3,18	3,28	3,38	3,50	3,62	3,75	3,88	4,02	4,16	4,30	4,46	4,61	4,76	4,92	5,07

Note: This table can be used to convert d^{t}_{20} to d^{20}_{20}

Table VI

Temperature corrections c required for the density of natural or concentrated musts, measured with an *ordinary-glass* pycnometer-or hydrometer at t °C, to correct to 20 °C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000} \quad \begin{array}{l} - \text{ if } t^o \text{ is less than } 20\ ^oC \\ + \text{ if } t^o \text{ is more than } 20\ ^oC \end{array}$$

		Masses volumiques																					
		1,05	1 ,06	1,07	1,08	1,09	1,10	1,11	1,12	1,13	1,14	1,15	1,16	1,18	1,20	1,22	1,24	1,26	1,28	1,30	1,32	1,34	1,36
Température en °C	10°	2,17	2,34	2,52	2,68	2,85	2,99	3,16	3,29	3,44	3,58	3,73	3,86	4,13	4,36	4,60	4,82	5,02	5,25	5,39	5,56	-5,73	5,87
	11°	2, 00	2,16	2,29	2,44	2,59	2,73	2,86	2,99	3,12	3,24	3,37	3,48	3,71	3,94	4,15	4,33	4,52	4,69	4,85	5,01	5,15	5,29
	12°	1,81	1,95	2,08	2,21	2,34	2,47	2,58	2,70	2,82	2,92	3,03	3,14	3,35	3,55	3,72	3,90	4,07	4,23	4,37	4,52	4,64	4,77
	13°	1,62	1,74	1,85	1,96	2,07	2,17	2,28	2,38	2,48	2,59	2,68	2,77	2,94	3,11	3,28	3,44	3,54	3,72	3,86	3,99	4,12	4,24
	14°	1,44	1,54	1,64	1,73	1,82	1,92	2,00	2,08	2,17	2,25	2,34	2,42	2,57	2,73	2,86	2,99	3,12	3,24	3,35	3,46	3,57	3,65
	15°	1,21	1,29	1,37	1,45	1,53	1,60	1,68	1,75	1,82	1,89	1,97	2,03	2,16	2,28	2,40	2,51	2,61	2,71	2,80	2,89	2,94	3,01
	16°	1,00	1,06	1,12	1,19	1,25	1,31	1,37	1,43	1,49	1,54	1,60	1,65	1,75	1,84	1,94	2,02	2,09	2,17	2,23	2,30	2,36	2,42
	17°	0,76	0,82	0,86	0,91	0,96	1,00	1,05	1,09	1,14	1,18	1,22	1,25	1,32	1,39	1,46	1,52	1,57	1,63	1,67	1,71	1,75	1,79
	18°	0,53	0,56	0,59	0,63	0,65	0,69	0,72	0,74	0,77	0,80	0,82	0,85	0,90	0,95	0,99	1,02	1,05	1,09	1,13	1,16	1,18	1,20
	19°	0,28	0,30	0,31	0,33	0,35	0,36	0,38	0,39	0,41	0,42	0,43	0,43	0,46	0,48	0,50	0,52	0,54	0,55	0,57	0,58	0,59	0,60
	20°																						
	21°	0,28	0,29	0,31	0,33	0,34	0,36	0,37	0,39	0,40	0,41	0,43	0,44	0,46	0,48	0,51	0,54	0,56	0,57	0,58	0,59	0,60	0,60
	22°	0,55	0,58	0,61	0,64	0,67	0,70	0,73	0,76	0,78	0,81	0,84	0,87	0,93	0,97	1,02	1,06	1,09	1,12	1,15	1,17	1,19	1,19
	23°	0,85	0,90	0,95	0,99	1,04	1,08	1,12	1,16	1,21	1,25	1,29	1,32	1,39	1,46	1,52	1,58	1,62	1,68	1,72	1,75	1,77	1,79
	24°	1,15	1,19	1,25	1,31	1,37	1,43	1,48	1,54	1,60	1,65	1,71	1,76	1,86	1,95	2,04	2,11	2,17	2,23	2,29	2,33	2,35	2,37
	25°	1,44	1,52	1,59	1,67	1,74	1,81	1,88	1,95	2,02	2,09	2,16	2,22	2,34	2,45	2,55	2,64	2,74	2,81	7,87	2,90	2,92	2,96
	26°	1,76	1,84	1,93	2,02	2,10	2,18	2,25	2,33	2,41	2,49	2,56	2,64	2,78	2,91	3,03	3,15	3,26	3,37	3,47	3,55	3,62	3,60
	27°	2,07	2,16	2,26	2,36	2,46	2,56	2,65	2,74	2,83	2,91	3,00	3,07	3,24	3,39	3,55	3,69	3,82	3,94	4,04	4,14	4,23	4,30
	28°	2,39	2,51	2,63	2,74	2,85	2,96	3,06	3,16	3,28	3,38	3,48	3,57	3,75	3,92	4,08	4,23	4,37	4,51	4,62	4,73	4,80	4,86
	29°	2,74	2,86	2,97	3,09	3,22	3,34	3,46	3,57	3,69	3,90	3,90	4,00	4,20	4,39	4,58	4,74	4,90	5,05	5,19	5,31	5,40	5,48
	30°	3,06	3,21	3,35	3,50	3,63	3,77	3,91	4,02	4,15	4,28	4,40	4,52	4,75	4,96	5,16	5,35	5,52	5,67	5,79	5,91	5,99	6,04

Note: This table can be used to convert d^t_{20} to d^{20}_{20}

Table VII

Temperature corrections *c* required for the density of dessert wines, measured in an *ordinary-glass* pycnometer, or hydrometer at *t* °C to correct this to 20 °C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000}$$

- if t^o is less than 20 °C
+ if t^o is more than 20 °C

	13% vol. wine							15% vol. wine							17% vol. wine						
	Density							Density							Density						
Temperature in °C	1,000	1,020	1,040	1,060	1,080	1,100	1,120	1,000	1,020	1,040	1,060	1,080	1,100	1,120	1,000	1,020	1,040	1,060	1,080	1,100	1,120
10°	2,24	2,58	2,93	3,27	3,59	3,89	4,18	2,51	2,85	3,20	3,54	3,85	4,02	4,46	2,81	3,15	3,50	3,84	4,15	4,45	4,74
11°	2,06	2,37	2,69	2,97	3,26	3,53	3,78	2,31	2,61	2,93	3,21	3,51	3,64	4,02	2,57	2,89	3,20	3,49	3,77	4,03	4,28
12°	1,87	2,14	2,42	2,67	2,94	3,17	3,40	2,09	2,36	2,64	2,90	3,16	3,27	3,61	2,32	2,60	2,87	3,13	3,39	3,63	3,84
13°	1,69	1,93	2,14	2,37	2,59	2,80	3,00	1,88	2,12	2,34	2,56	2,78	2,88	3,19	2,09	2,33	2,55	2,77	2,98	3,19	3,39
14°	1,49	1,70	1,90	2,09	2,27	2,44	2,61	1,67	1,86	2,06	2,25	2,45	2,51	2,77	1,83	2,03	2,23	2,42	2,61	2,77	2,94
15°	1,25	1,42	1,59	1,75	1,90	2,05	2,19	1,39	1,56	1,72	1,88	2,03	2,11	2,32	1,54	1,71	1,87	2,03	2,18	2,32	2,47
16°	1,03	1,17	1,30	1,43	1,55	1,67	1,78	1,06	1,27	1,40	1,53	1,65	1,77	1,88	1,25	1,39	1,52	1,65	1,77	1,89	2,00
17°	0,80	0,90	1,00	1,09	1,17	1,27	1,36	0,87	0,98	1,08	1,17	1,26	1,35	1,44	0,96	1,06	1,16	1,26	1,35	1,44	1,52
18°	0,54	0,61	0,68	0,75	0,81	0,86	0,92	0,60	0,66	0,73	0,80	0,85	0,91	0,97	0,66	0,72	0,79	0,86	0,92	0,97	1,03
19°	0,29	0,33	0,36	0,39	0,42	0,45	0,48	0,32	0,36	0,39	0,42	0,45	0,48	0,51	0,35	0,38	0,41	0,45	0,48	0,51	0,53
20°																					
21°	0,29	0,32	0,35	0,39	0,42	0,45	0,47	0,32	0,35	0,38	0,42	0,45	0,48	0,50	0,34	0,38	0,41	0,44	0,47	0,50	0,53
22°	0,57	0,64	0,70	0,76	0,82	0,88	0,93	0,63	0,69	0,75	0,81	0,87	0,93	0,99	0,68	0,75	0,81	0,87	0,93	0,99	1,04
23°	0,89	0,98	1,08	1,17	1,26	1,34	1,43	0,97	1,06	1,16	1,25	1,34	1,42	1,51	1,06	1,15	1,25	1,34	1,42	1,51	1,59
24°	1,22	1,34	1,44	1,56	1,68	1,79	1,90	1,32	1,44	1,54	1,66	1,78	1,89	2,00	1,43	1,56	1,65	1,77	1,89	2,00	2,11
25°	1,61	1,68	1,83	1,98	2,12	2,26	2,40	1,66	1,81	1,96	2,11	2,25	2,39	2,52	1,80	1,94	2,09	2,24	2,39	2,52	2,66
26°	1,87	2,05	2,22	2,40	2,56	2,71	2,87	2,02	2,20	2,37	2,54	2,70	2,85	3,01	2,18	2,36	2,53	2,71	2,86	3,02	3,17
27°	2,21	2,42	2,60	2,80	3,00	3,18	3,35	2,39	2,59	2,78	2,98	3,17	3,35	3,52	2,58	2,78	2,97	3,17	3,36	3,54	3,71
28°	2,56	2,80	3,02	3,25	3,47	3,67	3,89	2,75	2,89	3,22	3,44	3,66	3,96	4,07	2,97	3,21	3,44	3,66	3,88	4,09	4,30
29°	2,93	3,19	3,43	3,66	3,91	4,14	4,37	3,16	3,41	3,65	3,89	4,13	4,36	4,59	3,40	3,66	3,89	4,13	4,38	4,61	4,82
30°	3,31	3,57	3,86	4,15	4,41	4,66	4,92	3,55	3,81	4,10	4,38	4,66	4,90	5,16	3,82	4,08	4,37	4,65	4,93	5,17	5,42

Table VII (cont'd)

Temperature corrections *c* required for the density of dessert wines, measured in an *ordinary-glass* pycnometer, or hydrometer at *t* °C to correct this to 20 °C.

$$\rho_{20} = \rho_t \pm \frac{c}{1000}$$ - if t^o is less than 20 °C
+ if t^o is more than 20 °C

		19 % vol. wine							21 % vol. wine						
		Density							Density						
		1,00	1,02	1,04	1,06	1,08	1,10	1,12	1,00	1,02	1,04	1,06	1,08	1,10	1,12
Temperatures in °C	10°	3,14	3,48	3,83	4,17	4,48	4,78	5,07	3,50	3,84	4,19	4,52	4,83	5,12	5,41
	11°	2,87	3,18	3,49	3,78	4,06	4,32	4,57	3,18	3,49	3,80	4,09	4,34	4,63	4,88
	12°	2,58	2,96	3,13	3,39	3,65	3,88	4,10	2,86	3,13	3,41	3,67	3,92	4,15	4,37
	13°	2,31	2,55	2,77	2,99	3,20	3,41	3,61	2,56	2,79	3,01	3,23	3,44	3,65	3,85
	14°	2,03	2,23	2,43	2,61	2,80	2,96	3,13	2,23	2,43	2,63	2,81	3,00	3,16	3,33
	15°	1,69	1,86	2,02	2,18	2,33	2,48	2,62	1,86	2,03	2,19	2,35	2,50	2,65	2,80
	16°	1,38	1,52	1,65	1,78	1,90	2,02	2,13	1,51	1,65	1,78	1,91	2,03	2,15	2,26
	17°	1,06	1,16	1,26	1 ,35	1,44	1,53	1,62	1,15	1,25	1,35	1,45	1,54	1,63	1,71
	18°	0,73	0,79	0,85	0,92	0,98	1,03	1,09	0,79	0,85	0,92	0,98	1,05	1,10	1,15
	19°	0,38	0,41	0,44	0,48	0,51	0,52	0,56	0,41	0,44	0,47	0,51	0,54	0,57	0,59
	20°														
	21°	0,37	0,41	0,44	0,47	0,50	0,53	0,56	0,41	0,44	0,47	0,51	0,54	0,57	0,59
	22°	0,75	0,81	0,87	0,93	0,99	1,04	1,10	0,81	0,88	0,94	1,00	1,06	1,10	1,17
	23°	1,15	1,30	1,34	1,43	1,51	1,60	1,68	1,25	1,34	1,44	1,63	1,61	1,70	1,78
	24°	1,55	1,67	1,77	1,89	2,00	2,11	2,23	1,68	1,80	1,90	2,02	2,13	2,25	2,36
	25°	1,95	2,09	2,24	2,39	2,53	2,67	2,71	2,11	2,25	2,40	2,55	2,69	2,83	2,97
	26°	2,36	2,54	2,71	2,89	3,04	3,20	3,35	2,55	2,73	2,90	3,07	3,22	3,38	3,54
	27°	2,79	2,99	3,18	3,38	3,57	3,75	3,92	3,01	3,20	3,40	3,59	3,78	3,96	4,13
	28°	3,20	3,44	3,66	3,89	4,11	4,32	4,53	3,46	3,69	3,93	4,15	4,36	4,58	4,77
	29°	3,66	3,92	4,15	4,40	4,64	4,87	5,08	3,95	4,20	4,43	4,68	4,92	5,15	5,36
	30°	4,11	4,37	4,66	4,94	5,22	5,46	5,71	4,42	4,68	4,97	5,25	5,53	5,77	6,02

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