RESOLUTION OIV-OENO 466-2012

MODIFICATION OF THE METHOD OF EVALUATION BY REFRACTOMETRY OF THE SUGAR CONCENTRATION IN GRAPES, MUSTS, CONCENTRATED GRAPE MUSTS AND RECTIFIED CONCENTRATED GRAPE MUSTS (OENO 21/2004)

THE GENERAL ASSEMBLY

IN VIEW of article 2, paragraph 2 iv of the Agreement of 3rd April 2001 establishing the International Organisation of Vine and Wine,

AT THE PROPOSAL of the Methods of Analysis Sub-commission,

GIVEN that a table was given in pre-existing internationally recognised regulations containing the correspondence between the refractive index, the sucrose % (m/m), the sugar level expressed in g/l and g/kg and the potential alcoholic strength by volume (ABV) for musts and concentrated musts

GIVEN the linear relationship (coefficient of regression = 1.0000) that exists between the sugar values in g/l contained in the aforementioned table, and the corresponding potential alcoholic strength by volume (ABV) percentage expressed by:

sugar level in g/l x·0.05943 = alcoholic strength by volume (ABV) %

GIVEN that pre-existing internationally recognised regulations gave the correspondence between the refractive index expressed in sucrose % (m/m) and the alcoholic strength by volume (ABV) % for grape sugar in the relative annexes

HAVING CONSIDERED that the tables facilitating the calculation of sugar transformation into alcohol must be kept available to wine operators even after the repeal of said regulations

DECIDES to modify tables II and III of the type I method of evaluation by refractometry of the sugar concentration in grapes, musts, concentrated grape musts and rectified concentrated grape musts (OENO 21/2004) in the Compendium of International Methods of Analysis, by adding the data for the potential Alcoholic strength by volume (ABV) % at 20 °C as follows:

TABLE II

Table giving the sugar content in musts and concentrated musts in grams per litre and grams per kilogram, determined by means of a refractometer graduated either in percentage by mass of sucrose at 20 °C, or in refractive index at 20 °C. The density and the potential % alcoholic strength by volume (ABV) at 20 °C are also given.

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Saccharose % (m/m)	Refractive index at 20°C	Density at 20°C	Sugars in g/l	Sugars in g/kg	ABV % vol at 20°C
10.0	1.34782	1.0391	82.2	79.1	4.89
10.1	1.34798	1.0395	83.3	80.1	4.95
10.2	1.34813	1.0399	84.3	81.1	5.01
10.3	1.34829	1.0403	85.4	82.1	5.08
10.4	1.34844	1.0407	86.5	83.1	5.14
10.5	1.34860	1.0411	87.5	84.1	5.20
10.6	1.34875	1.0415	88.6	85.0	5.27
10.7	1.34891	1.0419	89.6	86.0	5.32
10.8	1.34906	1.0423	90.7	87.0	5.39
10.9	1.34922	1.0427	91.8	88.0	5.46
11.0	1.34937	1.0431	92.8	89.0	5.52
11.1	1.34953	1.0436	93.9	90.0	5.58
11.2	1.34968	1.0440	95.0	91.0	5.65
11.3	1.34984	1.0444	96.0	92.0	5.71
11.4	1.34999	1.0448	97.1	92.9	5.77
11.5	1.35015	1.0452	98.2	93.9	5.84
11.6	1.35031	1.0456	99.3	94.9	5.90
11.7	1.35046	1.0460	100.3	95.9	5.96

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11.8	1.35062	1.0464	101.4	96.9	6.03
11.9	1.35077	1.0468	102.5	97.9	6.09
12.0	1.35093	1.0472	103.5	98.9	6.15
12.1	1.35109	1.0477	104.6	99.9	6.22
12.2	1.35124	1.0481	105.7	100.8	6.28
12.3	1.35140	1.0485	106.8	101.8	6.35
12.4	1.35156	1.0489	107.8	102.8	6.41
12.5	1.35171	1.0493	108.9	103.8	6.47
12.6	1.35187	1.0497	110.0	104.8	6.54
12.7	1.35203	1.0501	111.1	105.8	6.60
12.8	1.35219	1.0506	112.2	106.8	6.67
12.9	1.35234	1.0510	113.2	107.8	6.73
13.0	1.35250	1.0514	114.3	108.7	6.79
13.1	1.35266	1.0518	115.4	109.7	6.86
13.2	1.35282	1.0522	116.5	110.7	6.92
13.3	1.35298	1.0527	117.6	111.7	6.99
13.4	1.35313	1.0531	118.7	112.7	7.05
13.5	1.35329	1.0535	119.7	113.7	7.11
13.6	1.35345	1.0539	120.8	114.7	7.18
13.7	1.35361	1.0543	121.9	115.6	7.24

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13.8	1.35377	1.0548	123.0	116.6	7.31
13.9	1.35393	1.0552	124.1	117.6	7.38
14.0	1.35408	1.0556	125.2	118.6	7.44
14.1	1.35424	1.0560	126.3	119.6	7.51
14.2	1.35440	1.0564	127.4	120.6	7.57
14.3	1.35456	1.0569	128.5	121.6	7.64
14.4	1.35472	1.0573	129.6	122.5	7.70
14.5	1.35488	1.0577	130.6	123.5	7.76
14.6	1.35504	1.0581	131.7	124.5	7.83
14.7	1.35520	1.0586	132.8	125.5	7.89
14.8	1.35536	1.0590	133.9	126.5	7.96
14.9	1.35552	1.0594	135.0	127.5	8.02
15.0	1.35568	1.0598	136.1	128.4	8.09
15.1	1.35584	1.0603	137.2	129.4	8.15
15.2	1.35600	1.0607	138.3	130.4	8.22
15.3	1.35616	1.0611	139.4	131.4	8.28
15.4	1.35632	1.0616	140.5	132.4	8.35
15.5	1.35648	1.0620	141.6	133.4	8.42
15.6	1.35664	1.0624	142.7	134.3	8.48
15.7	1.35680	1.0628	143.8	135.3	8.55

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15.8	1.35696	1.0633	144.9	136.3	8.61
15.9	1.35713	1.0637	146.0	137.3	8.68
16.0	1.35729	1.0641	147.1	138.3	8.74
16.1	1.35745	1.0646	148.2	139.3	8.81
16.2	1.35761	1.0650	149.3	140.2	8.87
16.3	1.35777	1.0654	150.5	141.2	8.94
16.4	1.35793	1.0659	151.6	142.2	9.01
16.5	1.35810	1.0663	152.7	143.2	9.07
16.6	1.35826	1.0667	153.8	144.2	9.14
16.7	1.35842	1.0672	154.9	145.1	9.21
16.8	1.35858	1.0676	156.0	146.1	9.27
16.9	1.35874	1.0680	157.1	147.1	9.34
17.0	1.35891	1.0685	158.2	148.1	9.40
17.1	1.35907	1.0689	159.3	149.1	9.47
17.2	1.35923	1.0693	160.4	150.0	9.53
17.3	1.35940	1.0698	161.6	151.0	9.60
17.4	1.35956	1.0702	162.7	152.0	9.67
17.5	1.35972	1.0707	163.8	153.0	9.73
17.6	1.35989	1.0711	164.9	154.0	9.80
17.7	1.36005	1.0715	166.0	154.9	9.87

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17.8	1.36021	1.0720	167.1	155.9	9.93
17.9	1.36038	1.0724	168.3	156.9	10.00
18.0	1.36054	1.0729	169.4	157.9	10.07
18.1	1.36070	1.0733	170.5	158.9	10.13
18.2	1.36087	1.0737	171.6	159.8	10.20
18.3	1.36103	1.0742	172.7	160.8	10.26
18.4	1.36120	1.0746	173.9	161.8	10.33
18.5	1.36136	1.0751	175.0	162.8	10.40
18.6	1.36153	1.0755	176.1	163.7	10.47
18.7	1.36169	1.0760	177.2	164.7	10.53
18.8	1.36185	1.0764	178.4	165.7	10.60
18.9	1.36202	1.0768	179.5	166.7	10.67
19.0	1.36219	1.0773	180.6	167.6	10.73
19.1	1.36235	1.0777	181.7	168.6	10.80
19.2	1.36252	1.0782	182.9	169.6	10.87
19.3	1.36268	1.0786	184.0	170.6	10.94
19.4	1.36285	1.0791	185.1	171.5	11.00
19.5	1.36301	1.0795	186.2	172.5	11.07
19.6	1.36318	1.0800	187.4	173.5	11.14
19.7	1.36334	1.0804	188.5	174.5	11.20

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19.8	1.36351	1.0809	189.6	175.4	11.27
19.9	1.36368	1.0813	190.8	176.4	11.34
20.0	1.36384	1.0818	191.9	177.4	11.40
20.1	1.36401	1.0822	193.0	178.4	11.47
20.2	1.36418	1.0827	194.2	179.3	11.54
20.3	1.36434	1.0831	195.3	180.3	11.61
20.4	1.36451	1.0836	196.4	181.3	11.67
20.5	1.36468	1.0840	197.6	182.3	11.74
20.6	1.36484	1.0845	198.7	183.2	11.81
20.7	1.36501	1.0849	199.8	184.2	11.87
20.8	1.36518	1.0854	201.0	185.2	11.95
20.9	1.36535	1.0858	202.1	186.1	12.01
21.0	1.36551	1.0863	203.3	187.1	12.08
21.1	1.36568	1.0867	204.4	188.1	12.15
21.2	1.36585	1.0872	205.5	189.1	12.21
21.3	1.36602	1.0876	206.7	190.0	12.28
21.4	1.36619	1.0881	207.8	191.0	12.35
21.5	1.36635	1.0885	209.0	192.0	12.42
21.6	1.36652	1.0890	210.1	192.9	12.49
21.7	1.36669	1.0895	211.3	193.9	12.56

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21.8	1.36686	1.0899	212.4	194.9	12.62
21.9	1.36703	1.0904	213.6	195.9	12.69
22.0	1.36720	1.0908	214.7	196.8	12.76
22.1	1.36737	1.0913	215.9	197.8	12.83
22.2	1.36754	1.0917	217.0	198.8	12.90
22.3	1.36771	1.0922	218.2	199.7	12.97
22.4	1.36787	1.0927	219.3	200.7	13.03
22.5	1.36804	1.0931	220.5	201.7	13.10
22.6	1.36821	1.0936	221.6	202.6	13.17
22.7	1.36838	1.0940	222.8	203.6	13.24
22.8	1.36855	1.0945	223.9	204.6	13.31
22.9	1.36872	1.0950	225.1	205.5	13.38
23.0	1.36889	1.0954	226.2	206.5	13.44
23.1	1.36906	1.0959	227.4	207.5	13.51
23.2	1.36924	1.0964	228.5	208.4	13.58
23.3	1.36941	1.0968	229.7	209.4	13.65
23.4	1.36958	1.0973	230.8	210.4	13.72
23.5	1.36975	1.0977	232.0	211.3	13.79
23.6	1.36992	1.0982	233.2	212.3	13.86
23.7	1.37009	1.0987	234.3	213.3	13.92

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23.8	1.37026	1.0991	235.5	214.2	14.00
23.9	1.37043	1.0996	236.6	215.2	14.06
24.0	1.37060	1.1001	237.8	216.2	14.13
24.1	1.37078	1.1005	239.0	217.1	14.20
24.2	1.37095	1.1010	240.1	218.1	14.27
24.3	1.37112	1.1015	241.3	219.1	14.34
24.4	1.37129	1.1019	242.5	220.0	14.41
24.5	1.37146	1.1024	243.6	221.0	14.48
24.6	1.37164	1.1029	244.8	222.0	14.55
24.7	1.37181	1.1033	246.0	222.9	14.62
24.8	1.37198	1.1038	247.1	223.9	14.69
24.9	1.37216	1.1043	248.3	224.8	14.76
25.0	1.37233	1.1047	249.5	225.8	14.83
25.1	1.37250	1.1052	250.6	226.8	14.89
25.2	1.37267	1.1057	251.8	227.7	14.96
25.3	1.37285	1.1062	253.0	228.7	15.04
25.4	1.37302	1.1066	254.1	229.7	15.10
25.5	1.37319	1.1071	255.3	230.6	15.17
25.6	1.37337	1.1076	256.5	231.6	15.24
25.7	1.37354	1.1080	257.7	232.5	15.32

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25.8	1.37372	1.1085	258.8	233.5	15.38
25.9	1.37389	1.1090	260.0	234.5	15.45
26.0	1.37407	1.1095	261.2	235.4	15.52
26.1	1.37424	1.1099	262.4	236.4	15.59
26.2	1.37441	1.1104	263.6	237.3	15.67
26.3	1.37459	1.1109	264.7	238.3	15.73
26.4	1.37476	1.1114	265.9	239.3	15.80
26.5	1.37494	1.1118	267.1	240.2	15.87
26.6	1.37511	1.1123	268.3	241.2	15.95
26.7	1.37529	1.1128	269.5	242.1	16.02
26.8	1.37546	1.1133	270.6	243.1	16.08
26.9	1.37564	1.1138	271.8	244.1	16.15
27.0	1.37582	1.1142	273.0	245.0	16.22
27.1	1.37599	1.1147	274.2	246.0	16.30
27.2	1.37617	1.1152	275.4	246.9	16.37
27.3	1.37634	1.1157	276.6	247.9	16.44
27.4	1.37652	1.1161	277.8	248.9	16.51
27.5	1.37670	1.1166	278.9	249.8	16.58
27.6	1.37687	1.1171	280.1	250.8	16.65
27.7	1.37705	1.1176	281.3	251.7	16.72

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27.8	1.37723	1.1181	282.5	252.7	16.79
27.9	1.37740	1.1185	283.7	253.6	16.86
28.0	1.37758	1.1190	284.9	254.6	16.93
28.1	1.37776	1.1195	286.1	255.5	17.00
28.2	1.37793	1.1200	287.3	256.5	17.07
28.3	1.37811	1.1205	288.5	257.5	17.15
28.4	1.37829	1.1210	289.7	258.4	17.22
28.5	1.37847	1.1214	290.9	259.4	17.29
28.6	1.37864	1.1219	292.1	260.3	17.36
28.7	1.37882	1.1224	293.3	261.3	17.43
28.8	1.37900	1.1229	294.5	262.2	17.50
28.9	1.37918	1.1234	295.7	263.2	17.57
29.0	1.37936	1.1239	296.9	264.2	17.64
29.1	1.37954	1.1244	298.1	265.1	17.72
29.2	1.37972	1.1248	299.3	266.1	17.79
29.3	1.37989	1.1253	300.5	267.0	17.86
29.4	1.38007	1.1258	301.7	268.0	17.93
29.5	1.38025	1.1263	302.9	268.9	18.00
29.6	1.38043	1.1268	304.1	269.9	18.07
29.7	1.38061	1.1273	305.3	270.8	18.14

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29.8	1.38079	1.1278	306.5	271.8	18.22
29.9	1.38097	1.1283	307.7	272.7	18.29
30.0	1.38115	1.1287	308.9	273.7	18.36
30.1	1.38133	1.1292	310.1	274.6	18.43
30.2	1.38151	1.1297	311.3	275.6	18.50
30.3	1.38169	1.1302	312.6	276.5	18.58
30.4	1.38187	1.1307	313.8	277.5	18.65
30.5	1.38205	1.1312	315.0	278.5	18.72
30.6	1.38223	1.1317	316.2	279.4	18.79
30.7	1.38241	1.1322	317.4	280.4	18.86
30.8	1.38259	1.1327	318.6	281.3	18.93
30.9	1.38277	1.1332	319.8	282.3	19.01
31.0	1.38296	1.1337	321.1	283.2	19.08
31.1	1.38314	1.1342	322.3	284.2	19.15
31.2	1.38332	1.1346	323.5	285.1	19.23
31.3	1.38350	1.1351	324.7	286.1	19.30
31.4	1.38368	1.1356	325.9	287.0	19.37
31.5	1.38386	1.1361	327.2	288.0	19.45
31.6	1.38405	1.1366	328.4	288.9	19.52
31.7	1.38423	1.1371	329.6	289.9	19.59

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31.8	1.38441	1.1376	330.8	290.8	19.66
31.9	1.38459	1.1381	332.1	291.8	19.74
32.0	1.38478	1.1386	333.3	292.7	19.81
32.1	1.38496	1.1391	334.5	293.7	19.88
32.2	1.38514	1.1396	335.7	294.6	19.95
32.3	1.38532	1.1401	337.0	295.6	20.03
32.4	1.38551	1.1406	338.2	296.5	20.10
32.5	1.38569	1.1411	339.4	297.5	20.17
32.6	1.38587	1.1416	340.7	298.4	20.25
32.7	1.38606	1.1421	341.9	299.4	20.32
32.8	1.38624	1.1426	343.1	300.3	20.39
32.9	1.38643	1.1431	344.4	301.3	20.47
33.0	1.38661	1.1436	345.6	302.2	20.54
33.1	1.38679	1.1441	346.8	303.2	20.61
33.2	1.38698	1.1446	348.1	304.1	20.69
33.3	1.38716	1.1451	349.3	305.0	20.76
33.4	1.38735	1.1456	350.6	306.0	20.84
33.5	1.38753	1.1461	351.8	306.9	20.91
33.6	1.38772	1.1466	353.0	307.9	20.98
33.7	1.38790	1.1471	354.3	308.8	21.06

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33.8	1.38809	1.1476	355.5	309.8	21.13
33.9	1.38827	1.1481	356.8	310.7	21.20
34.0	1.38846	1.1486	358.0	311.7	21.28
34.1	1.38864	1.1491	359.2	312.6	21.35
34.2	1.38883	1.1496	360.5	313.6	21.42
34.3	1.38902	1.1501	361.7	314.5	21.50
34.4	1.38920	1.1507	363.0	315.5	21.57
34.5	1.38939	1.1512	364.2	316.4	21.64
34.6	1.38958	1.1517	365.5	317.4	21.72
34.7	1.38976	1.1522	366.7	318.3	21.79
34.8	1.38995	1.1527	368.0	319.2	21.87
34.9	1.39014	1.1532	369.2	320.2	21.94
35.0	1.39032	1.1537	370,5	321.1	22,02
35.1	1.39051	1.1542	371,8	322.1	22,10
35.2	1.39070	1.1547	373,0	323.0	22,17
35.3	1.39088	1.1552	374,3	324.0	22,24
35.4	1.39107	1.1557	375,5	324.9	22,32
35.5	1.39126	1.1563	376,8	325.9	22,39
35.6	1.39145	1.1568	378,0	326.8	22,46
35.7	1.39164	1.1573	379,3	327.8	22,54

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35.8	1.39182	1.1578	380,6	328.7	22,62
35.9	1.39201	1.1583	381,8	329.6	22,69
36.0	1.39220	1.1588	383,1	330.6	22,77
36.1	1.39239	1.1593	384,4	331.5	22,84
36.2	1.39258	1.1598	385,6	332.5	22,92
36.3	1.39277	1.1603	386,9	333.4	22,99
36.4	1.39296	1.1609	388,1	334.4	23,06
36.5	1.39314	1.1614	389,4	335.3	23,14
36.6	1.39333	1.1619	390,7	336.3	23,22
36.7	1.39352	1.1624	392,0	337.2	23,30
36.8	1.39371	1.1629	393,2	338.1	23,37
36.9	1.39390	1.1634	394,5	339.1	23,45
37.0	1.39409	1.1640	395,8	340.0	23,52
37.1	1.39428	1.1645	397,0	341.0	23,59
37.2	1.39447	1.1650	398,3	341.9	23,67
37.3	1.39466	1.1655	399,6	342.9	23,75
37.4	1.39485	1.1660	400,9	343.8	23,83
37.5	1.39504	1.1665	402,1	344.7	23,90
37.6	1.39524	1.1671	403,4	345.7	23,97
37.7	1.39543	1.1676	404,7	346.6	24,05

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37.8	1.39562	1.1681	406,0	347.6	24,13
37.9	1.39581	1.1686	407,3	348.5	24,21
38.0	1.39600	1.1691	408,6	349.4	24,28
38.1	1.39619	1.1697	409,8	350.4	24,35
38.2	1.39638	1.1702	411,1	351.3	24,43
38.3	1.39658	1.1707	412,4	352.3	24,51
38.4	1.39677	1.1712	413,7	353.2	24,59
38.5	1.39696	1.1717	415,0	354.2	24,66
38.6	1.39715	1.1723	416,3	355.1	24,74
38.7	1.39734	1.1728	417,6	356.0	24,82
38.8	1.39754	1.1733	418,8	357.0	24,89
38.9	1.39773	1.1738	420,1	357.9	24,97
39.0	1.39792	1.1744	421,4	358.9	25,04
39.1	1.39812	1.1749	422,7	359.8	25,12
39.2	1.39831	1.1754	424,0	360.7	25,20
39.3	1.39850	1.1759	425,3	361.7	25,28
39.4	1.39870	1.1765	426,6	362.6	25,35
39.5	1.39889	1.1770	427,9	363.6	25,43
39.6	1.39908	1.1775	429,2	364.5	25,51
39.7	1.39928	1.1780	430,5	365.4	25,58

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39.8	1.39947	1.1786	431,8	366.4	25,66
39.9	1.39967	1.1791	433,1	367.3	25,74
40.0	1.39986	1.1796	434.4	368.3	25.82
40.1	1.40006	1.1801	435.7	369.2	25.89
40.2	1.40025	1.1807	437.0	370.1	25.97
40.3	1.40044	1.1812	438.3	371.1	26.05
40.4	1.40064	1.1817	439.6	372.0	26.13
40.5	1.40083	1.1823	440.9	373.0	26.20
40.6	1.40103	1.1828	442.2	373.9	26.28
40.7	1.40123	1.1833	443.6	374.8	26.36
40.8	1.40142	1.1839	444.9	375.8	26.44
40.9	1.40162	1.1844	446.2	376.7	26.52
41.0	1.40181	1.1849	447.5	377.7	26.59
41.1	1.40201	1.1855	448.8	378.6	26.67
41.2	1.40221	1.1860	450.1	379.5	26.75
41.3	1.40240	1.1865	451.4	380.5	26.83
41.4	1.40260	1.1871	452.8	381.4	26.91
41.5	1.40280	1.1876	454.1	382.3	26.99
41.6	1.40299	1.1881	455.4	383.3	27.06
41.7	1.40319	1.1887	456.7	384.2	27.14

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41.8	1.40339	1.1892	458.0	385.2	27.22
41.9	1.40358	1.1897	459.4	386.1	27.30
42.0	1.40378	1.1903	460.7	387.0	27.38
42.1	1.40398	1.1908	462.0	388.0	27.46
42.2	1.40418	1.1913	463.3	388.9	27.53
42.3	1.40437	1.1919	464.7	389.9	27.62
42.4	1.40457	1.1924	466.0	390.8	27.69
42.5	1.40477	1.1929	467.3	391.7	27.77
42.6	1.40497	1.1935	468.6	392.7	27.85
42.7	1.40517	1.1940	470.0	393.6	27.93
42.8	1.40537	1.1946	471.3	394.5	28.01
42.9	1.40557	1.1951	472.6	395.5	28.09
43.0	1.40576	1.1956	474.0	396.4	28.17
43.1	1.40596	1.1962	475.3	397.3	28.25
43.2	1.40616	1.1967	476.6	398.3	28.32
43.3	1.40636	1.1973	478.0	399.2	28.41
43.4	1.40656	1.1978	479.3	400.2	28.48
43.5	1.40676	1.1983	480.7	401.1	28.57
43.6	1.40696	1.1989	482.0	402.0	28.65
43.7	1.40716	1.1994	483.3	403.0	28.72

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43.8	1.40736	1.2000	484.7	403.9	28.81
43.9	1.40756	1.2005	486.0	404.8	28.88
44.0	1.40776	1.2011	487.4	405.8	28.97
44.1	1.40796	1.2016	488.7	406.7	29.04
44.2	1.40817	1.2022	490.1	407.6	29.13
44.3	1.40837	1.2027	491.4	408.6	29.20
44.4	1.40857	1.2032	492.8	409.5	29.29
44.5	1.40877	1.2038	494.1	410.4	29.36
44.6	1.40897	1.2043	495.5	411.4	29.45
44.7	1.40917	1.2049	496.8	412.3	29.52
44.8	1.40937	1.2054	498.2	413.3	29.61
44.9	1.40958	1.2060	499.5	414.2	29.69
45.0	1.40978	1.2065	500.9	415.1	29.77
45.1	1.40998	1.2071	502.2	416.1	29.85
45.2	1.41018	1.2076	503.6	417.0	29.93
45.3	1.41039	1.2082	504.9	417.9	30.01
45.4	1.41059	1.2087	506.3	418.9	30.09
45.5	1.41079	1.2093	507.7	419.8	30.17
45.6	1.41099	1.2098	509.0	420.7	30.25
45.7	1.41120	1.2104	510.4	421.7	30.33

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45.8	1.41140	1.2109	511.7	422.6	30.41
45.9	1.41160	1.2115	513.1	423.5	30.49
46.0	1.41181	1.2120	514.5	424.5	30.58
46.1	1.41201	1.2126	515.8	425.4	30.65
46.2	1.41222	1.2131	517.2	426.3	30.74
46.3	1.41242	1.2137	518.6	427.3	30.82
46.4	1.41262	1.2142	519.9	428.2	30.90
46.5	1.41283	1.2148	521.3	429.1	30.98
46.6	1.41303	1.2154	522.7	430.1	31.06
46.7	1.41324	1.2159	524.1	431.0	31.15
46.8	1.41344	1.2165	525.4	431.9	31.22
46.9	1.41365	1.2170	526.8	432.9	31.31
47.0	1.41385	1.2176	528.2	433.8	31.39
47.1	1.41406	1.2181	529.6	434.7	31.47
47.2	1.41427	1.2187	530.9	435.7	31.55
47.3	1.41447	1.2192	532.3	436.6	31.63
47.4	1.41468	1.2198	533.7	437.5	31.72
47.5	1.41488	1.2204	535.1	438.5	31.80
47.6	1.41509	1.2209	536.5	439.4	31.88
47.7	1.41530	1.2215	537.9	440.3	31.97

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47.8	1.41550	1.2220	539.2	441.3	32.04
47.9	1.41571	1.2226	540.6	442.2	32.13
48.0	1.41592	1.2232	542.0	443.1	32.21
48.1	1.41612	1.2237	543.4	444.1	32.29
48.2	1.41633	1.2243	544.8	445.0	32.38
48.3	1.41654	1.2248	546.2	445.9	32.46
48.4	1.41674	1.2254	547.6	446.8	32.54
48.5	1.41695	1.2260	549.0	447.8	32.63
48.6	1.41716	1.2265	550.4	448.7	32.71
48.7	1.41737	1.2271	551.8	449.6	32.79
48.8	1.41758	1.2277	553.2	450.6	32.88
48.9	1.41779	1.2282	554.6	451.5	32.96
49.0	1.41799	1.2288	556.0	452.4	33.04
49.1	1.41820	1.2294	557.4	453.4	33.13
49.2	1.41841	1.2299	558.8	454.3	33.21
49.3	1.41862	1.2305	560.2	455.2	33.29
49.4	1.41883	1.2311	561.6	456.2	33.38
49.5	1.41904	1.2316	563.0	457.1	33.46
49.6	1.41925	1.2322	564.4	458.0	33.54
49.7	1.41946	1.2328	565.8	458.9	33.63

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49.8	1.41967	1.2333	567.2	459.9	33.71
49.9	1.41988	1.2339	568.6	460.8	33.79
50.0	1.42009	1.2345	570.0	461.7	33.88
50.1	1.42030	1.2350	571.4	462.7	33.96
50.2	1.42051	1.2356	572.8	463.6	34.04
50.3	1.42072	1.2362	574.2	464.5	34.12
50.4	1.42093	1.2368	575.6	465.4	34.21
50.5	1.42114	1.2373	577.1	466.4	34.30
50.6	1.42135	1.2379	578.5	467.3	34.38
50.7	1.42156	1.2385	579.9	468.2	34.46
50.8	1.42177	1.2390	581.3	469.2	34.55
50.9	1.42199	1.2396	582.7	470.1	34.63
51.0	1.42220	1.2402	584.2	471.0	34.72
51.1	1.42241	1.2408	585.6	471.9	34.80
51.2	1.42262	1.2413	587.0	472.9	34.89
51.3	1.42283	1.2419	588.4	473.8	34.97
51.4	1.42305	1.2425	589.9	474.7	35.06
51.5	1.42326	1.2431	591.3	475.7	35.14
51.6	1.42347	1.2436	592.7	476.6	35.22
51.7	1.42368	1.2442	594.1	477.5	35.31

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51.8	1.42390	1.2448	595.6	478.4	35.40
51.9	1.42411	1.2454	597.0	479.4	35.48
52.0	1.42432	1.2460	598.4	480.3	35.56
52.1	1.42454	1.2465	599.9	481.2	35.65
52.2	1.42475	1.2471	601.3	482.1	35.74
52.3	1.42496	1.2477	602.7	483.1	35.82
52.4	1.42518	1.2483	604.2	484.0	35.91
52.5	1.42539	1.2488	605.6	484.9	35.99
52.6	1.42561	1.2494	607.0	485.8	36.07
52.7	1.42582	1.2500	608.5	486.8	36.16
52.8	1.42604	1.2506	609.9	487.7	36.25
52.9	1.42625	1.2512	611.4	488.6	36.34
53.0	1.42647	1.2518	612.8	489.5	36.42
53.1	1.42668	1.2523	614.2	490.5	36.50
53.2	1.42690	1.2529	615.7	491.4	36.59
53.3	1.42711	1.2535	617.1	492.3	36.67
53.4	1.42733	1.2541	618.6	493.2	36.76
53.5	1.42754	1.2547	620.0	494.2	36.85
53.6	1.42776	1.2553	621.5	495.1	36.94
53.7	1.42798	1.2558	622.9	496.0	37.02

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53.8	1.42819	1.2564	624.4	496.9	37.11
53.9	1.42841	1.2570	625.8	497.9	37.19
54.0	1.42863	1.2576	627.3	498.8	37.28
54.1	1.42884	1.2582	628.7	499.7	37.36
54.2	1.42906	1.2588	630.2	500.6	37.45
54.3	1.42928	1.2594	631.7	501.6	37.54
54.4	1.42949	1.2600	633.1	502.5	37.63
54.5	1.42971	1.2606	634.6	503.4	37.71
54.6	1.42993	1.2611	636.0	504.3	37.80
54.7	1.43015	1.2617	637.5	505.2	37.89
54.8	1.43036	1.2623	639.0	506.2	37.98
54.9	1.43058	1.2629	640.4	507.1	38.06
55.0	1.43080	1.2635	641.9	508.0	38.15
55.1	1.43102	1.2641	643.4	508.9	38.24
55.2	1.43124	1.2647	644.8	509.9	38.32
55.3	1.43146	1.2653	646.3	510.8	38.41
55.4	1.43168	1.2659	647.8	511.7	38.50
55.5	1.43189	1.2665	649.2	512.6	38.58
55.6	1.43211	1.2671	650.7	513.5	38.67
55.7	1.43233	1.2677	652.2	514.5	38.76

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55.8	1.43255	1.2683	653.7	515.4	38.85
55.9	1.43277	1.2689	655.1	516.3	38.93
56.0	1.43299	1.2695	656.6	517.2	39.02
56.1	1.43321	1.2701	658.1	518.1	39.11
56.2	1.43343	1.2706	659.6	519.1	39.20
56.3	1.43365	1.2712	661.0	520.0	39.28
56.4	1.43387	1.2718	662.5	520.9	39.37
56.5	1.43410	1.2724	664.0	521.8	39.46
56.6	1.43432	1.2730	665.5	522.7	39.55
56.7	1.43454	1.2736	667.0	523.7	39.64
56.8	1.43476	1.2742	668.5	524.6	39.73
56.9	1.43498	1.2748	669.9	525.5	39.81
57.0	1.43520	1.2754	671.4	526.4	39.90
57.1	1.43542	1.2760	672.9	527.3	39.99
57.2	1.43565	1.2766	674.4	528.3	40.08
57.3	1.43587	1.2773	675.9	529.2	40.17
57.4	1.43609	1.2779	677.4	530.1	40.26
57.5	1.43631	1.2785	678.9	531.0	40.35
57.6	1.43653	1.2791	680.4	531.9	40.44
57.7	1.43676	1.2797	681.9	532.8	40.53

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57.8	1.43698	1.2803	683.4	533.8	40.61
57.9	1.43720	1.2809	684.9	534.7	40.70
58.0	1.43743	1.2815	686.4	535.6	40.79
58.1	1.43765	1.2821	687.9	536.5	40.88
58.2	1.43787	1.2827	689.4	537.4	40.97
58.3	1.43810	1.2833	690.9	538.3	41.06
58.4	1.43832	1.2839	692.4	539.3	41.15
58.5	1.43855	1.2845	693.9	540.2	41.24
58.6	1.43877	1.2851	695.4	541.1	41.33
58.7	1.43899	1.2857	696.9	542.0	41.42
58.8	1.43922	1.2863	698.4	542.9	41.51
58.9	1.43944	1.2870	699.9	543.8	41.60
59.0	1.43967	1.2876	701.4	544.8	41.68
59.1	1.43989	1.2882	702.9	545.7	41.77
59.2	1.44012	1.2888	704.4	546.6	41.86
59.3	1.44035	1.2894	706.0	547.5	41.96
59.4	1.44057	1.2900	707.5	548.4	42.05
59.5	1.44080	1.2906	709.0	549.3	42.14
59.6	1.44102	1.2912	710.5	550.2	42.23
59.7	1.44125	1.2919	712.0	551.1	42.31

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59.8	1.44148	1.2925	713.5	552.1	42.40
59.9	1.44170	1.2931	715.1	553.0	42.50
60.0	1.44193	1.2937	716.6	553.9	42.59
60.1	1.44216	1.2943	718.1	554.8	42.68
60.2	1.44238	1.2949	719.6	555.7	42.77
60.3	1.44261	1.2956	721.1	556.6	42.85
60.4	1.44284	1.2962	722.7	557.5	42.95
60.5	1.44306	1.2968	724.2	558.4	43.04
60.6	1.44329	1.2974	725.7	559.4	43.13
60.7	1.44352	1.2980	727.3	560.3	43.22
60.8	1.44375	1.2986	728.8	561.2	43.31
60.9	1.44398	1.2993	730.3	562.1	43.40
61.0	1.44420	1.2999	731.8	563.0	43.49
61.1	1.44443	1.3005	733.4	563.9	43.59
61.2	1.44466	1.3011	734.9	564.8	43.68
61.3	1.44489	1.3017	736.4	565.7	43.76
61.4	1.44512	1.3024	738.0	566.6	43.86
61.5	1.44535	1.3030	739.5	567.6	43.95
61.6	1.44558	1.3036	741.1	568.5	44.04
61.7	1.44581	1.3042	742.6	569.4	44.13

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61.8	1.44604	1.3049	744.1	570.3	44.22
61.9	1.44627	1.3055	745.7	571.2	44.32
62.0	1.44650	1.3061	747.2	572.1	44.41
62.1	1.44673	1.3067	748.8	573.0	44.50
62.2	1.44696	1.3074	750.3	573.9	44.59
62.3	1.44719	1.3080	751.9	574.8	44.69
62.4	1.44742	1.3086	753.4	575.7	44.77
62.5	1.44765	1.3092	755.0	576.6	44.87
62.6	1.44788	1.3099	756.5	577.5	44.96
62.7	1.44811	1.3105	758.1	578.5	45.05
62.8	1.44834	1.3111	759.6	579.4	45.14
62.9	1.44858	1.3118	761.2	580.3	45.24
63.0	1.44881	1.3124	762.7	581.2	45.33
63.1	1.44904	1.3130	764.3	582.1	45.42
63.2	1.44927	1.3137	765.8	583.0	45.51
63.3	1.44950	1.3143	767.4	583.9	45.61
63.4	1.44974	1.3149	769.0	584.8	45.70
63.5	1.44997	1.3155	770.5	585.7	45.79
63.6	1.45020	1.3162	772.1	586.6	45.89
63.7	1.45043	1.3168	773.6	587.5	45.98

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63.8	1.45067	1.3174	775.2	588.4	46.07
63.9	1.45090	1.3181	776.8	589.3	46.17
64.0	1.45113	1.3187	778.3	590.2	46.25
64.1	1.45137	1.3193	779.9	591.1	46.35
64.2	1.45160	1.3200	781.5	592.0	46.44
64.3	1.45184	1.3206	783.0	592.9	46.53
64.4	1.45207	1.3213	784.6	593.8	46.63
64.5	1.45230	1.3219	786.2	594.7	46.72
64.6	1.45254	1.3225	787.8	595.6	46.82
64.7	1.45277	1.3232	789.3	596.5	46.91
64.8	1.45301	1.3238	790.9	597.4	47.00
64.9	1.45324	1.3244	792.5	598.3	47.10
65.0	1.45348	1.3251	794.1	599.3	47.19
65.1	1.45371	1.3257	795.6	600.2	47.28
65.2	1.45395	1.3264	797.2	601.1	47.38
65.3	1.45418	1.3270	798.8	602.0	47.47
65.4	1.45442	1.3276	800.4	602.9	47.57
65.5	1.45466	1.3283	802.0	603.8	47.66
65.6	1.45489	1.3289	803.6	604.7	47.76
65.7	1.45513	1.3296	805.1	605.6	47.85

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65.8	1.45537	1.3302	806.7	606.5	47.94
65.9	1.45560	1.3309	808.3	607.4	48.04
66.0	1.45584	1.3315	809.9	608.3	48.13
66.1	1.45608	1.3322	811.5	609.2	48.23
66.2	1.45631	1.3328	813.1	610.1	48.32
66.3	1.45655	1.3334	814.7	611.0	48.42
66.4	1.45679	1.3341	816.3	611.9	48.51
66.5	1.45703	1.3347	817.9	612.8	48.61
66.6	1.45726	1.3354	819.5	613.7	48.70
66.7	1.45750	1.3360	821.1	614.6	48.80
66.8	1.45774	1.3367	822.7	615.5	48.89
66.9	1.45798	1.3373	824.3	616.3	48.99
67.0	1.45822	1.3380	825.9	617.2	49.08
67.1	1.45846	1.3386	827.5	618.1	49.18
67.2	1.45870	1.3393	829.1	619.0	49.27
67.3	1.45893	1.3399	830.7	619.9	49.37
67.4	1.45917	1.3406	832.3	620.8	49.46
67.5	1.45941	1.3412	833.9	621.7	49.56
67.6	1.45965	1.3419	835.5	622.6	49.65
67.7	1.45989	1.3425	837.1	623.5	49.75

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67.8	1.46013	1.3432	838.7	624.4	49.84
67.9	1.46037	1.3438	840.3	625.3	49.94
68.0	1.46061	1.3445	841.9	626.2	50.03
68.1	1.46085	1.3451	843.6	627.1	50.14
68.2	1.46109	1.3458	845.2	628.0	50.23
68.3	1.46134	1.3464	846.8	628.9	50.33
68.4	1.46158	1.3471	848.4	629.8	50.42
68.5	1.46182	1.3478	850.0	630.7	50.52
68.6	1.46206	1.3484	851.6	631.6	50.61
68.7	1.46230	1.3491	853.3	632.5	50.71
68.8	1.46254	1.3497	854.9	633.4	50.81
68.9	1.46278	1.3504	856.5	634.3	50.90
69.0	1.46303	1.3510	858.1	635.2	51.00
69.1	1.46327	1.3517	859.8	636.1	51.10
69.2	1.46351	1.3524	861.4	636.9	51.19
69.3	1.46375	1.3530	863.0	637.8	51.29
69.4	1.46400	1.3537	864.7	638.7	51.39
69.5	1.46424	1.3543	866.3	639.6	51.48
69.6	1.46448	1.3550	867.9	640.5	51.58
69.7	1.46473	1.3557	869.5	641.4	51.67

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69.8	1.46497	1.3563	871.2	642.3	51.78
69.9	1.46521	1.3570	872.8	643.2	51.87
70.0	1.46546	1.3576	874.5	644.1	51.97
70.1	1.46570	1.3583	876.1	645.0	52.07
70.2	1.46594	1.3590	877.7	645.9	52.16
70.3	1.46619	1.3596	879.4	646.8	52.26
70.4	1.46643	1.3603	881.0	647.7	52.36
70.5	1.46668	1.3610	882.7	648.5	52.46
70.6	1.46692	1.3616	884.3	649.4	52.55
70.7	1.46717	1.3623	886.0	650.3	52.65
70.8	1.46741	1.3630	887.6	651.2	52.75
70.9	1.46766	1.3636	889.3	652.1	52.85
71.0	1.46790	1.3643	890.9	653.0	52.95
71.1	1.46815	1.3650	892.6	653.9	53.05
71.2	1.46840	1.3656	894.2	654.8	53.14
71.3	1.46864	1.3663	895.9	655.7	53.24
71.4	1.46889	1.3670	897.5	656.6	53.34
71.5	1.46913	1.3676	899.2	657.5	53.44
71.6	1.46938	1.3683	900.8	658.3	53.53
71.7	1.46963	1.3690	902.5	659.2	53.64

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71.8	1.46987	1.3696	904.1	660.1	53.73
71.9	1.47012	1.3703	905.8	661.0	53.83
72.0	1.47037	1.3710	907.5	661.9	53.93
72.1	1.47062	1.3717	909.1	662.8	54.03
72.2	1.47086	1.3723	910.8	663.7	54.13
72.3	1.47111	1.3730	912.5	664.6	54.23
72.4	1.47136	1.3737	914.1	665.5	54.32
72.5	1.47161	1.3743	915.8	666.3	54.43
72.6	1.47186	1.3750	917.5	667.2	54.53
72.7	1.47210	1.3757	919.1	668.1	54.62
72.8	1.47235	1.3764	920.8	669.0	54.72
72.9	1.47260	1.3770	922.5	669.9	54.82
73.0	1.47285	1.3777	924.2	670.8	54.93
73.1	1.47310	1.3784	925.8	671.7	55.02
73.2	1.47335	1.3791	927.5	672.6	55.12
73.3	1.47360	1.3797	929.2	673.5	55.22
73.4	1.47385	1.3804	930.9	674.3	55.32
73.5	1.47410	1.3811	932.6	675.2	55.42
73.6	1.47435	1.3818	934.3	676.1	55.53
73.7	1.47460	1.3825	935.9	677.0	55.62

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73.8	1.47485	1.3831	937.6	677.9	55.72
73.9	1.47510	1.3838	939.3	678.8	55.82
74.0	1.47535	1.3845	941.0	679.7	55.92
74.1	1.47560	1.3852	942.7	680.6	56.02
74.2	1.47585	1.3859	944.4	681.4	56.13
74.3	1.47610	1.3865	946.1	682.3	56.23
74.4	1.47635	1.3872	947.8	683.2	56.33
74.5	1.47661	1.3879	949.5	684.1	56.43
74.6	1.47686	1.3886	951.2	685.0	56.53
74.7	1.47711	1.3893	952.9	685.9	56.63
74.8	1.47736	1.3899	954.6	686.8	56.73
74.9	1.47761	1.3906	956.3	687.7	56.83

TABLE III

Table giving the sugar content, expressed in invert sugar, of grape sugar in grams per litre and grams per kilogram, determined by means of a refractometer graduated either in percentage by mass of sucrose at 20 °C, or in refractive index at 20 °C. The density and the potential % alcoholic strength by volume (ABV) at 20 °C is also given.

Saccharose % (m/m)	Refractive index at 20°C	Density at 20°C	Sugars in g/l	Sugars in g/kg	ABV % vol at 20°C
50.0	1.42008	1.2342	627.6	508.5	37.30
50.1	1.42029	1.2348	629.3	509.6	37.40

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50.2	1.42050	1.2355	630.9	510.6	37.49
50.3	1.42071	1.2362	632.4	511.6	37.58
50.4	1.42092	1.2367	634.1	512.7	37.68
50.5	1.42113	1.2374	635.7	513.7	37.78
50.6	1.42135	1.2381	637.3	514.7	37.87
50.7	1.42156	1.2386	638.7	515.7	37.96
50.8	1.42177	1.2391	640.4	516.8	38.06
50.9	1.42198	1.2396	641.9	517.8	38.15
51.0	1.42219	1.2401	643.4	518.8	38.24
51.1	1.42240	1.2406	645.0	519.9	38.33
51.2	1.42261	1.2411	646.5	520.9	38.42
51.3	1.42282	1.2416	648.1	522.0	38.52
51.4	1.42304	1.2421	649.6	523.0	38.61
51.5	1.42325	1.2427	651.2	524.0	38.70
51.6	1.42347	1.2434	652.9	525.1	38.80
51.7	1.42368	1.2441	654.5	526.1	38.90
51.8	1.42389	1.2447	656.1	527.1	38.99
51.9	1.42410	1.2454	657.8	528.2	39.09
52.0	1.42432	1.2461	659.4	529.2	39.19
52.1	1.42453	1.2466	661.0	530.2	39.28

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52.2	1.42475	1.2470	662.5	531.3	39.37
52.3	1.42496	1.2475	664.1	532.3	39.47
52.4	1.42517	1.2480	665.6	533.3	39.56
52.5	1.42538	1.2486	667.2	534.4	39.65
52.6	1.42560	1.2493	668.9	535.4	39.75
52.7	1.42581	1.2500	670.5	536.4	39.85
52.8	1.42603	1.2506	672.2	537.5	39.95
52.9	1.42624	1.2513	673.8	538.5	40.04
53.0	1.42645	1.2520	675.5	539.5	40.14
53.1	1.42667	1.2525	677.1	540.6	40.24
53.2	1.42689	1.2530	678.5	541.5	40.32
53.3	1.42711	1.2535	680.2	542.6	40.42
53.4	1.42733	1.2540	681.8	543.7	40.52
53.5	1.42754	1.2546	683.4	544.7	40.61
53.6	1.42776	1.2553	685.1	545.8	40.72
53.7	1.42797	1.2560	686.7	546.7	40.81
53.8	1.42819	1.2566	688.4	547.8	40.91
53.9	1.42840	1.2573	690.1	548.9	41.01
54.0	1.42861	1.2580	691.7	549.8	41.11
54.1	1.42884	1.2585	693.3	550.9	41.20

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54.2	1.42906	1.2590	694.9	551.9	41.30
54.3	1.42927	1.2595	696.5	553.0	41.39
54.4	1.42949	1.2600	698.1	554.0	41.49
54.5	1.42971	1.2606	699.7	555.1	41.58
54.6	1.42993	1.2613	701.4	556.1	41.68
54.7	1.43014	1.2620	703.1	557.1	41.79
54.8	1.43036	1.2625	704.7	558.2	41.88
54.9	1.43058	1.2630	706.2	559.1	41.97
55.0	1.43079	1.2635	707.8	560.2	42.06
55.1	1.43102	1.2639	709.4	561.3	42.16
55.2	1.43124	1.2645	711.0	562.3	42.25
55.3	1.43146	1.2652	712.7	563.3	42.36
55.4	1.43168	1.2659	714.4	564.3	42.46
55.5	1.43189	1.2665	716.1	565.4	42.56
55.6	1.43211	1.2672	717.8	566.4	42.66
55.7	1.43233	1.2679	719.5	567.5	42.76
55.8	1.43255	1.2685	721.1	568.5	42.85
55.9	1.43277	1.2692	722.8	569.5	42.96
56.0	1.43298	1.2699	724.5	570.5	43.06
56.1	1.43321	1.2703	726.1	571.6	43.15

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56.2	1.43343	1.2708	727.7	572.6	43.25
56.3	1.43365	1.2713	729.3	573.7	43.34
56.4	1.43387	1.2718	730.9	574.7	43.44
56.5	1.43409	1.2724	732.6	575.8	43.54
56.6	1.43431	1.2731	734.3	576.8	43.64
56.7	1.43454	1.2738	736.0	577.8	43.74
56.8	1.43476	1.2744	737.6	578.8	43.84
56.9	1.43498	1.2751	739.4	579.9	43.94
57.0	1.43519	1.2758	741.1	580.9	44.04
57.1	1.43542	1.2763	742.8	582.0	44.14
57.2	1.43564	1.2768	744.4	583.0	44.24
57.3	1.43586	1.2773	745.9	584.0	44.33
57.4	1.43609	1.2778	747.6	585.1	44.43
57.5	1.43631	1.2784	749.3	586.1	44.53
57.6	1.43653	1.2791	751.0	587.1	44.63
57.7	1.43675	1.2798	752.7	588.1	44.73
57.8	1.43698	1.2804	754.4	589.2	44.83
57.9	1.43720	1.2810	756.1	590.2	44.94
58.0	1.43741	1.2818	757.8	591.2	45.04
58.1	1.43764	1.2822	759.5	592.3	45.14

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58.2	1.43784	1.2827	761.1	593.4	45.23
58.3	1.43909	1.2832	762.6	594.3	45.32
58.4	1.43832	1.2837	764.3	595.4	45.42
58.5	1.43854	1.2843	766.0	596.4	45.52
58.6	1.43877	1.2850	767.8	597.5	45.63
58.7	1.43899	1.2857	769.5	598.5	45.73
58.8	1.43922	1.2863	771.1	599.5	45.83
58.9	1.43944	1.2869	772.9	600.6	45.93
59.0	1.43966	1.2876	774.6	601.6	46.03
59.1	1.43988	1.2882	776.3	602.6	46.14
59.2	1.44011	1.2889	778.1	603.7	46.24
59.3	1.44034	1.2896	779.8	604.7	46.34
59.4	1.44057	1.2902	781.6	605.8	46.45
59.5	1.44079	1.2909	783.3	606.8	46.55
59.6	1.44102	1.2916	785.2	607.9	46.66
59.7	1.44124	1.2921	786.8	608.9	46.76
59.8	1.44147	1.2926	788.4	609.9	46.85
59.9	1.44169	1.2931	790.0	610.9	46.95
60.0	1.44192	1.2936	791.7	612.0	47.05
60.1	1.44215	1.2942	793.3	613.0	47.15

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60.2	1.44238	1.2949	795.2	614.1	47.26
60.3	1.44260	1.2956	796.9	615.1	47.36
60.4	1.44283	1.2962	798.6	616.1	47.46
60.5	1.44305	1.2969	800.5	617.2	47.57
60.6	1.44328	1.2976	802.2	618.2	47.67
60.7	1.44351	1.2981	803.9	619.3	47.78
60.8	1.44374	1.2986	805.5	620.3	47.87
60.9	1.44397	1.2991	807.1	621.3	47.97
61.0	1.44419	1.2996	808.7	622.3	48.06
61.1	1.44442	1.3002	810.5	623.4	48.17
61.2	1.44465	1.3009	812.3	624.4	48.27
61.3	1.44488	1.3016	814.2	625.5	48.39
61.4	1.44511	1.3022	815.8	626.5	48.48
61.5	1.44534	1.3029	817.7	627.6	48.60
61.6	1.44557	1.3036	819.4	628.6	48.70
61.7	1.44580	1.3042	821.3	629.7	48.81
61.8	1.44603	1.3049	823.0	630.7	48.91
61.9	1.44626	1.3056	824.8	631.7	49.02
62.0	1.44648	1.3062	826.6	632.8	49.12
62.1	1.44672	1.3068	828.3	633.8	49.23

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62.2	1.44695	1.3075	830.0	634.8	49.33
62.3	1.44718	1.3080	831.8	635.9	49.43
62.4	1.44741	1.3085	833.4	636.9	49.53
62.5	1.44764	1.3090	835.1	638.0	49.63
62.6	1.44787	1.3095	836.8	639.0	49.73
62.7	1.44810	1.3101	838.5	640.0	49.83
62.8	1.44833	1.3108	840.2	641.0	49.93
62.9	1.44856	1.3115	842.1	642.1	50.05
63.0	1.44879	1.3121	843.8	643.1	50.15
63.1	1.44902	1.3128	845.7	644.2	50.26
63.2	1.44926	1.3135	847.5	645.2	50.37
63.3	1.44949	1.3141	849.3	646.3	50.47
63.4	1.44972	1.3148	851.1	647.3	50.58
63.5	1.44995	1.3155	853.0	648.4	50.69
63.6	1.45019	1.3161	854.7	649.4	50.79
63.7	1.45042	1.3168	856.5	650.4	50.90
63.8	1.45065	1.3175	858.4	651.5	51.01
63.9	1.45088	1.3180	860.0	652.5	51.11
64.0	1.45112	1.3185	861.6	653.5	51.20
64.1	1.45135	1.3190	863.4	654.6	51.31

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64.2	1.45158	1.3195	865.1	655.6	51.41
64.3	1.45181	1.3201	866.9	656.7	51.52
64.4	1.45205	1.3208	868.7	657.7	51.63
64.5	1.45228	1.3215	870.6	658.8	51.74
64.6	1.45252	1.3221	872.3	659.8	51.84
64.7	1.45275	1.3228	874.1	660.8	51.95
64.8	1.45299	1.3235	876.0	661.9	52.06
64.9	1.45322	1.3241	877.8	662.9	52.17
65.0	1.45347	1.3248	879.7	664.0	52.28
65.1	1.45369	1.3255	881.5	665.0	52.39
65.2	1.45393	1.3261	883.2	666.0	52.49
65.3	1.45416	1.3268	885.0	667.0	52.60
65.4	1.45440	1.3275	886.9	668.1	52.71
65.5	1.45463	1.3281	888.8	669.2	52.82
65.6	1.45487	1.3288	890.6	670.2	52.93
65.7	1.45510	1.3295	892.4	671.2	53.04
65.8	1.45534	1.3301	894.2	672.3	53.14
65.9	1.45557	1.3308	896.0	673.3	53.25
66.0	1.45583	1.3315	898.0	674.4	53.37
66.1	1.45605	1.3320	899.6	675.4	53.46

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66.2	1.45629	1.3325	901.3	676.4	53.56
66.3	1.45652	1.3330	903.1	677.5	53.67
66.4	1.45676	1.3335	904.8	678.5	53.77
66.5	1.45700	1.3341	906.7	679.6	53.89
66.6	1.45724	1.3348	908.5	680.6	53.99
66.7	1.45747	1.3355	910.4	681.7	54.11
66.8	1.45771	1.3361	912.2	682.7	54.21
66.9	1.45795	1.3367	913.9	683.7	54.31
67.0	1.45820	1.3374	915.9	684.8	54.43
67.1	1.45843	1.3380	917.6	685.8	54.53
67.2	1.45867	1.3387	919.6	686.9	54.65
67.3	1.45890	1.3395	921.4	687.9	54.76
67.4	1.45914	1.3400	923.1	688.9	54.86
67.5	1.45938	1.3407	925.1	690.0	54.98
67.6	1.45962	1.3415	927.0	691.0	55.09
67.7	1.45986	1.3420	928.8	692.1	55.20
67.8	1.46010	1.3427	930.6	693.1	55.31
67.9	1.46034	1.3434	932.6	694.2	55.42
68.0	1.46060	1.3440	934.4	695.2	55.53
68.1	1.46082	1.3447	936.2	696.2	55.64

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68.2	1.46106	1.3454	938.0	697.2	55.75
68.3	1.46130	1.3460	939.9	698.3	55.86
68.4	1.46154	1.3466	941.8	699.4	55.97
68.5	1.46178	1.3473	943.7	700.4	56.08
68.6	1.46202	1.3479	945.4	701.4	56.19
68.7	1.46226	1.3486	947.4	702.5	56.30
68.8	1.46251	1.3493	949.2	703.5	56.41
68.9	1.46275	1.3499	951.1	704.6	56.52
69.0	1.46301	1.3506	953.0	705.6	56.64
69.1	1.46323	1.3513	954.8	706.6	56.74
69.2	1.46347	1.3519	956.7	707.7	56.86
69.3	1.46371	1.3526	958.6	708.7	56.97
69.4	1.46396	1.3533	960.6	709.8	57.09
69.5	1.46420	1.3539	962.4	710.8	57.20
69.6	1.46444	1.3546	964.3	711.9	57.31
69.7	1.46468	1.3553	966.2	712.9	57.42
69.8	1.46493	1.3560	968.2	714.0	57.54
69.9	1.46517	1.3566	970.0	715.0	57.65
70.0	1.46544	1.3573	971.8	716.0	57.75
70.1	1.46565	1.3579	973.8	717.1	57.87

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70.2	1.46590	1.3586	975.6	718.1	57.98
70.3	1.46614	1.3593	977.6	719.2	58.10
70.4	1.46639	1.3599	979.4	720.2	58.21
70.5	1.46663	1.3606	981.3	721.2	58.32
70.6	1.46688	1.3613	983.3	722.3	58.44
70.7	1.46712	1.3619	985.2	723.4	58.55
70.8	1.46737	1.3626	987.1	724.4	58.66
70.9	1.46761	1.3633	988.9	725.4	58.77
71.0	1.46789	1.3639	990.9	726.5	58.89
71.1	1.46810	1.3646	992.8	727.5	59.00
71.2	1.46835	1.3653	994.8	728.6	59.12
71.3	1.46859	1.3659	996.6	729.6	59.23
71.4	1.46884	1.3665	998.5	730.7	59.34
71.5	1.46908	1.3672	1000.4	731.7	59.45
71.6	1.46933	1.3678	1002.2	732.7	59.56
71.7	1.46957	1.3685	1004.2	733.8	59.68
71.8	1.46982	1.3692	1006.1	734.8	59.79
71.9	1.47007	1.3698	1008.0	735.9	59.91
72.0	1.47036	1.3705	1009.9	736.9	60.02
72.1	1.47056	1.3712	1012.0	738.0	60.14

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72.2	1.47081	1.3718	1013.8	739.0	60.25
72.3	1.47106	1.3725	1015.7	740.0	60.36
72.4	1.47131	1.3732	1017.7	741.1	60.48
72.5	1.47155	1.3738	1019.5	742.1	60.59
72.6	1.47180	1.3745	1021.5	743.2	60.71
72.7	1.47205	1.3752	1023.4	744.2	60.82
72.8	1.47230	1.3758	1025.4	745.3	60.94
72.9	1.47254	1.3765	1027.3	746.3	61.05
73.0	1.47284	1.3772	1029.3	747.4	61.17
73.1	1.47304	1.3778	1031.2	748.4	61.28
73.2	1.47329	1.3785	1033.2	749.5	61.40
73.3	1.47354	1.3792	1035.1	750.5	61.52
73.4	1.47379	1.3798	1037.1	751.6	61.63
73.5	1.47404	1.3805	1039.0	752.6	61.75
73.6	1.47429	1.3812	1040.9	753.6	61.86
73.7	1.47454	1.3818	1042.8	754.7	61.97
73.8	1.47479	1.3825	1044.8	755.7	62.09
73.9	1.47504	1.3832	1046.8	756.8	62.21
74.0	1.47534	1.3838	1048.6	757.8	62.32
74.1	1.47554	1.3845	1050.7	758.9	62.44

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74.2	1.47579	1.3852	1052.6	759.9	62.56
74.3	1.47604	1.3858	1054.6	761.0	62.67
74.4	1.47629	1.3865	1056.5	762.0	62.79
74.5	1.47654	1.3871	1058.5	763.1	62.91
74.6	1.47679	1.3878	1060.4	764.1	63.02
74.7	1.47704	1.3885	1062.3	765.1	63.13
74.8	1.47730	1.3892	1064.4	766.2	63.26
74.9	1.47755	1.3898	1066.3	767.2	63.37
75.0	1.47785	1.3905	1068.3	768.3	63.49

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