

# SCIENTIFIC TABLES

EDITED BY K. DIEM AND C. LENTNER

SEVENTH EDITION

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**PUBLISHED BY CIBA-GEIGY LIMITED, BASLE, SWITZERLAND**

## Publisher's Foreword

This 7th edition of the former *Geigy Scientific Tables* pursues the aim of earlier editions, namely to provide doctors and biologists with basic data in a concise form and thus spare them much searching in the literature.

In the 6th edition the main changes from the previous edition consisted of an extension of the mathematical, physical and chemical data and a new chapter devoted to biochemistry; in this edition the principal difference is the greatly expanded medical part of the book. The increasing extent to which physical, physicochemical and biochemical methods are finding application in medicine has resulted in the last few years in an immense accumulation of new data whose proper evaluation can be undertaken only by specialists. For this reason we have been compelled in this edi-

tion to enlist the cooperation of outside experts to a much greater degree than in the past. Here we would like to thank all those who have contributed in this way - whether in the form of original articles or expert advice - for their invaluable help. Their names are listed overleaf.

We would also like to express our appreciation once again of the assistance of all those who have made suggestions or drawn our attention to errors. If we have been unable to adopt all the suggestions put to us, this has been due to the limits set us by the physical compass of the *Scientific Tables*. Users can rest assured that we shall continue to do our best to meet their wishes in the future.

CIBA-GEIGY Limited, Basle

## Editors' Foreword

All the fields covered by the 6th edition of the *Scientific Tables* are again represented in this new edition with the exception of 'Infectious Diseases', the chapter on which appears as a separate publication. The thoroughgoing revision of the remaining chapters has resulted in a number of major changes, of which the following are worthy of special mention.

The data on units of measurement and the physical constants take account of decisions and recommendations adopted by the various international commissions up to March 1969, in particular those concerned with the introduction of the International System of Units. The adoption of the unified scale of atomic weights based on the isotope carbon-12 has involved the recalculation of molecular weights throughout the book. In the physicochemical part of the book a chapter on pH standards has been added, and the data on buffer solutions have been recalculated to the pH scale of the National Bureau of Standards.

'Biochemistry' has been greatly enlarged, particularly by the inclusion of more data on nucleic acids and protein and fatty-acid synthesis as well as by the addition of a new chapter on 'Inborn Errors of Metabolism'. Throughout this section - as in the other sections - the recommendations on nomenclature made by the International Union of Pure and

Applied Chemistry and the International Union of Biochemistry have been largely adhered to.

In the section on nutrition due regard has been paid to the considerable advances made in recent years in knowledge of the nutritional significance of the vitamins; and important new sources have been utilized in revising the data on the composition of foods.

Of the chapters comprising the section on 'Composition and Functions of the Body', those on the composition of the body, renal function and respiration in particular have been greatly extended. Under the heading of body fluids the subject of blood enzymes has been given much more thorough treatment, and chapters on the synovial fluid and sweat have been added.

Under body measurements the normal data of pregnancy have been completely revised, and the chapter now includes tables of weights of the organs.

The final section of the book is now that on hormones, an arrangement that has permitted the inclusion of more recent endocrinological data from this rapidly advancing field than would otherwise have been possible.

K. DIEM  
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### Notes for the guidance of users

Apart from the main contents (above) and general index (pages 765 et seq.) the user will find the contents of the chapter on 'Statistical Methods' on page 145, that of the chapters on 'Constituents of Living Matter' and 'Metabolism' on page 307; in addition there is a separate detailed index to the chapter on 'Statistical Methods' on pages 197-198.

Zero values are indicated by the figure 0 throughout the book. A dash (-) signifies that the value is unknown, and this sign should on no account be interpreted as a zero value.

As a rule, the meanings of symbols and abbreviations are given where they first occur. For units of measurement an alphabetical list is available on page 199.

In the numerical tables, a point over the last figure (or figures) indicates a recurring figure (or figures), thus

$$1.\overset{.}{6} = 1.666666 \dots \\ 1.\overset{.}{6}52\overset{.}{7}8 = 1.65278278278 \dots$$

In general the number of places given has been dictated by the space available. The user should abstract as many as he needs and round off accordingly.

Exact values have been distinguished from rounded-off values by printing the last figure in bold-face type. Thus, 1.125 7 would be the rounded-off value of, say, 1.1257354 ..., while 1.1257 is an exact number. This notation is used in particular for the arbitrarily defined values of constants.

When they have been calculated according to statistical procedures (usually as mean value  $\pm$  2 standard deviations), normal ranges are given under the heading '95% range' (note that this practice differs from that adopted in previous editions).

For obvious reasons we have had to restrict bibliographical references to a representative selection of recently published original papers and reviews. In fields where research activity is currently high a rather fuller bibliography is given. The abbreviations used in the literature references are those recommended by the UNESCO and WHO (*World Medical Periodicals*, World Medical Association, New York, 1961).

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This 7th edition of the former *Geigy Scientific Tables* pursues the aim of earlier editions, namely to provide doctors and biologists with basic data in a concise form and thus spare them much searching in the literature.

In the 6th edition the main changes from the previous edition consisted of an extension of the mathematical, physical and chemical data and a new chapter devoted to biochemistry; in this edition the principal difference is the greatly expanded medical part of the book. The increasing extent to which physical, physicochemical and biochemical methods are finding application in medicine has resulted in the last few years in an immense accumulation of new data whose proper evaluation can be undertaken only by specialists. For this reason we have been compelled in this edi-

tion to enlist the cooperation of outside experts to a much greater degree than in the past. Here we would like to thank all those who have contributed in this way – whether in the form of original articles or expert advice – for their invaluable help. Their names are listed overleaf.

We would also like to express our appreciation once again of the assistance of all those who have made suggestions or drawn our attention to errors. If we have been unable to adopt all the suggestions put to us, this has been due to the limits set us by the physical compass of the *Scientific Tables*. Users can rest assured that we shall continue to do our best to meet their wishes in the future.

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## Editors' Foreword

All the fields covered by the 6th edition of the *Scientific Tables* are again represented in this new edition with the exception of 'Infectious Diseases', the chapter on which appears as a separate publication. The thoroughgoing revision of the remaining chapters has resulted in a number of major changes, of which the following are worthy of special mention.

The data on units of measurement and the physical constants take account of decisions and recommendations adopted by the various international commissions up to March 1969, in particular those concerned with the introduction of the International System of Units. The adoption of the unified scale of atomic weights based on the isotope carbon-12 has involved the recalculation of molecular weights throughout the book. In the physicochemical part of the book a chapter on pH standards has been added, and the data on buffer solutions have been recalculated to the pH scale of the National Bureau of Standards.

'Biochemistry' has been greatly enlarged, particularly by the inclusion of more data on nucleic acids and protein and fatty-acid synthesis as well as by the addition of a new chapter on 'Inborn Errors of Metabolism'. Throughout this section – as in the other sections – the recommendations on nomenclature made by the International Union of Pure and

Applied Chemistry and the International Union of Biochemistry have been largely adhered to.

In the section on nutrition due regard has been paid to the considerable advances made in recent years in knowledge of the nutritional significance of the vitamins; and important new sources have been utilized in revising the data on the composition of foods.

Of the chapters comprising the section on 'Composition and Functions of the Body', those on the composition of the body, renal function and respiration in particular have been greatly extended. Under the heading of body fluids the subject of blood enzymes has been given much more thorough treatment, and chapters on the synovial fluid and sweat have been added.

Under body measurements the normal data of pregnancy have been completely revised, and the chapter now includes tables of weights of the organs.

The final section of the book is now that on hormones, an arrangement that has permitted the inclusion of more recent endocrinological data from this rapidly advancing field than would otherwise have been possible.

K. DIEM  
C. LENTNER

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# Mathematical Constants – Greek Alphabet

9

## Mathematical constants

Bernoulli numbers		Euler numbers		Prime numbers < 100	
n	B <sub>n</sub>	n	E <sub>n</sub>	Number	log <sub>10</sub> (mantissa)
1	1/ 6	1	1	2	30102 99956 63981 19521
2	1/ 30	2	5	3	47712 12547 19662 43730
3	1/ 42	3	61	5	69897 00043 36018 80479
4	1/ 30	4	1385	7	84509 80400 14256 83071
5	5/ 66	5	50521	11	04139 26851 58225 04075
6	.691/2730	6	27 02765	13	11394 33523 06836 76921
7	7/ 6	7	1993 60981	17	23044 89213 78273 92854
8	.3617/ 510	8	1 93915 12145	19	27875 36009 52828 96154
9	.43867/ 798	9	240 48796 75441	23	36172 78360 17592 87887
10	1 74611/ 330	10	37037 11882 37525	29	46239 79978 98956 06733
11	8 54513/ 138	11	69 34887 43931 37901	31	49136 16938 34272 67967
12	2363 64091/2730	12	15514 53416 35570 86905	37	56820 17240 66994 99681
13	85 53103/ 6	13	.40 87072 50929 31238 92361	41	61278 38567 19735 49451
<i>Constants</i>					
Constant	Value	log <sub>10</sub>			
$\pi$	3.14159 26535 89793 23846	0.49714 98726 94133 85435		59	77085 20116 42144 19026
$\pi^2$	9.86960 44010 89358 61883	0.99429 97453 88267 70870		61	78532 98350 10767 03389
$(2\pi)^{-1/2}$	0.39894 22804 01432 67794	0.60091 00658 20942 47522-1		67	82607 48027 00826 43415
e	2.71828 18284 59045 23536	= M		71	85125 83487 19075 28609
M = log <sub>10</sub> e = lg e	0.43429 44819 03251 82765			73	86332 28601 20455 90107
1/M = log <sub>10</sub> 10 = ln 10	2.30258 50929 94045 68402			79	89762 70912 90441 42799
$\gamma$ (EULER's constant)	0.57721 56649 01532 86061	0.76133 81087 83167 61054-1		83	91907 80923 76073 90383
				89	94939 00066 44912 78472
				97	98677 17342 66244 85178

## Greek alphabet

Greek character	Greek name	Roman equivalent
A α	alpha	A a
B β	beta	B b
Γ γ	gamma	G g
Δ δ	delta	D d
Ε ε, ε	epsilon	Ē ē
Z ζ	zeta	Z z
H η	eta	Ē ē
Θ θ, θ	theta	Th th
I ι	iota	I i
K κ, κ	kappa	K k
Λ λ	lambda	L l
M μ	mu	M m
N ν	nu	N n
Ξ ξ	xi	X x
O ο	omicron	Ö ö
Π π, ϖ	pi	P p
R ρ	rho	R r
Σ σ, σ	sigma	S s
T τ	tau	T t
Υ υ	upsilon	Y y
Φ φ, ϕ	phi	Ph ph
X χ	chi	Ch ch
Ψ ψ	psi	Ps ps
Ω ω	omega	Ö ö

## Prefixes and symbols for decimal multiples and submultiples of units<sup>1</sup>

Power of ten	Prefix	Symbol
10 <sup>12</sup>	tera	T
10 <sup>9</sup>	giga	G
10 <sup>6</sup>	mega	M
10 <sup>3</sup>	kilo	k
10 <sup>2</sup>	hecto	h
10 <sup>1</sup>	deca*	da
10 <sup>-1</sup>	deci	d
10 <sup>-3</sup>	centi	c
10 <sup>-6</sup>	milli	m
10 <sup>-9</sup>	micro	μ
10 <sup>-12</sup>	nano	n
10 <sup>-15</sup>	pico	p
10 <sup>-18</sup>	femto	f
10 <sup>-21</sup>	atto	a

\* Also 'deka'.

<sup>1</sup> Conférence générale des Poids et Mesures, Comptes rendus des séances de la 11<sup>e</sup> Conférence générale des Poids et Mesures, Paris 1960, Gauthier-Villars, Paris, 1961, page 87; Comptes rendus des séances de la 12<sup>e</sup> Conférence générale des Poids et Mesures, Paris 1964, Gauthier-Villars, Paris, 1964, page 94.

## Four-Place Common Logarithms

x	log x										Proportional parts									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	
100	0000	0004	0009	0013	0017	0022	0026	0030	0035	0039	0	1	1	2	2	3	3	3	4	
101	0043	0048	0052	0056	0060	0065	0069	0073	0077	0082	0	1	1	2	2	3	3	3	4	
102	0086	0090	0095	0099	0103	0107	0111	0116	0120	0124	0	1	1	2	2	3	3	3	4	
103	0128	0133	0137	0141	0145	0149	0154	0158	0162	0166	0	1	1	2	2	3	3	3	4	
104	0170	0175	0179	0183	0187	0191	0195	0199	0204	0208	0	1	1	2	2	3	3	3	4	
105	0212	0216	0220	0224	0228	0233	0237	0241	0245	0249	0	1	1	2	2	3	3	3	4	
106	0253	0257	0261	0265	0269	0273	0278	0282	0286	0290	0	1	1	2	2	3	3	3	4	
107	0294	0298	0302	0306	0310	0314	0318	0322	0326	0330	0	1	1	2	2	3	3	3	4	
108	0334	0338	0342	0346	0350	0354	0358	0362	0366	0370	0	1	1	2	2	3	3	3	4	
109	0374	0378	0382	0386	0390	0394	0398	0402	0406	0410	0	1	1	2	2	3	3	3	4	
110	0009	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	8	12	17	21	25	29	33	37	
111	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34	
112	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	6	10	14	17	21	24	28	31	
113	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29	
114	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27	
115	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	22	25	
116	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	6	8	11	13	16	18	21	24	
117	2314	2340	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22	
118	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	10	12	14	16	19	21	
119	2768	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	5	7	9	11	13	16	18	20	
120	3110	3132	3154	3175	3196	3218	3240	3261	3281	3301	2	4	6	8	11	13	15	17	19	
121	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18	
122	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17	
123	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17	
124	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16	
125	3979	4014	4031	4048	4065	4082	4099	4116	4133	4150	2	5	7	9	10	12	14	15	16	
126	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	5	7	9	10	11	13	15	16	
127	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	5	7	9	11	13	14	16	17	
128	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	5	7	9	10	12	14	16	17	
129	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13	
130	4771	4786	4800	4814	4829	4843	4857	4871	4886	4899	1	3	4	6	7	9	10	11	13	
131	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12	
132	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	6	7	8	9	11	12	
133	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	6	7	8	9	10	12	
134	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	6	7	8	9	10	11	
135	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	3	4	6	7	9	10	11	11	
136	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	3	4	6	7	8	10	11	11	
137	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	3	4	6	7	8	9	10	10	
138	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	3	4	6	7	8	9	10	10	
139	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	3	4	6	7	8	9	10	10	
140	6021	6031	6042	6053	6064	6075	6086	6096	6107	6117	1	3	4	6	7	8	9	10	10	
141	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	3	4	6	7	8	9	10	9	
142	6242	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	3	4	6	7	8	9	10	9	
143	6335	6345	6355	6375	6385	6395	6405	6415	6425	6435	1	3	4	6	7	8	9	10	9	
144	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	3	4	6	7	8	9	10	9	
145	6532	6542	6551	6561	6571	6580	6590	6599	6618	6628	1	3	4	6	7	8	9	10	9	
146	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	3	4	6	7	8	9	10	9	
147	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	3	4	6	7	8	9	10	9	
148	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	3	4	6	7	8	9	10	9	
149	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	3	4	6	7	8	9	10	9	
150	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	3	4	6	7	8	9	10	9	
151	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	3	4	6	7	8	9	10	9	
152	7169	7178	7187	7195	7203	7210	7218	7226	7235	7244	1	3	4	6	7	8	9	10	9	
153	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	3	4	6	7	8	9	10	9	
154	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	3	4	6	7	8	9	10	9	
155	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	3	4	6	7	8	9	10	9	
156	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	3	4	6	7	8	9	10	9	
157	7559	7566	7574	7582	7589	7596	7604	7612	7619	7627	1	3	4	6	7	8	9	10	9	
158	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	3	4	6	7	8	9	10	9	
159	7709	7716	7723	7731	7738	7745	7752	7759	7766	7774	1	3	4	6	7	8	9	10	9	
160	7782	7789	7803	7810	7818	7825	7832	7839	7846	7854	1	3	4	6	7	8	9	10	9	
161	7853	7860	7867	7875	7882	7889	7896	7903	7910	7917	1	3	4	6	7	8	9	10	9	
162	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	3	4	6	7	8	9	10	9	
163	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	3	4	6	7	8	9	10	9	
164	8062	8075	8082	8089	8096	8103	8109	8116	8122	8129	1	3	4	6	7	8	9	10	9	
165	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	3	4	6	7	8	9	10	9	
166	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	3	4	6	7	8	9	10	9	
167	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	3	4	6	7	8	9	10	9	
168	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	3	4	6	7	8	9	10	9	
169	8386	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	3	4	6	7	8	9	10	9	
170	8451	8457	8463	8469	8475	8482	8488	8494	8500	8506	1	3	4	6	7	8	9	10	9	
171	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	3	4	6	7	8	9	10	9	
172	8579	8585	8591	8597	8603	8609	8615	8621	8627	8633	1	3	4	6	7	8	9	10	9	
173	8633	8639	8645	8651	865															