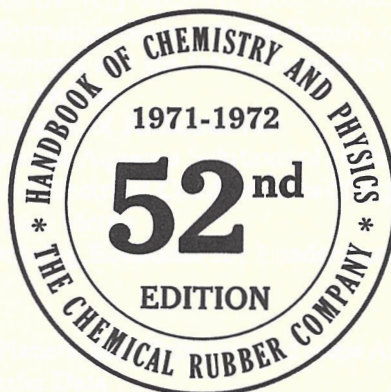




Preface to the Second Edition

Handbook OF Chemistry and Physics

A Ready-Reference Book of Chemical and Physical Data



EDITOR

ROBERT C. WEAST, PH.D.

Vice President, Research, Consolidated Natural Gas Service Company, Inc.

Formerly Professor of Chemistry at Case Institute of Technology

In collaboration with a large number of professional chemists and physicists whose assistance is acknowledged in the list of general collaborators and in connection with the particular tables or sections involved.

Published by

THE CHEMICAL RUBBER CO.

18901 Cranwood Parkway, Cleveland, Ohio, 44128



HANDICRAFT MOTORS

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

Handicraft

© 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971 by THE CHEMICAL RUBBER CO.

Copyright 1918, 1920 by The Chemical Rubber Company (Copyright renewed 1946, 1948 by Chemical Rubber Publishing Company)

Copyright 1922 (Copyright renewed 1950), 1925 (Copyright renewed 1953), 1926 (Copyright renewed 1954), 1927 (Copyright renewed 1955), 1929 (Copyright renewed 1957), 1936, 1937, (Copyright renewed 1965 by The Chemical Rubber Co.) 1939, 1940 (Copyright renewed 1968 by The Chemical Rubber Co.), 1941 (Copyright renewed 1969 by The Chemical Rubber Co.), 1942 (Copyright renewed 1970 by The Chemical Rubber Co.), 1943 (Copyright renewed 1971 by The Chemical Rubber Co.), 1944, 1945, 1947, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956 by Chemical Rubber Publishing Company

© 1957, 1958, 1959, 1960, 1961, 1962 by Chemical Rubber Publishing Company

All Rights Reserved

Library of Congress Card No. 13-11056

PRINTED IN U. S. A.

MAGNETIC MATERIALS (Continued)

Permanent Magnet Alloys

Material	Percent composition (remainder Fe)	Heat treat- ment* (tem- perature, °C)	Magnet- izing force H_{max} , oersteds	Coercive force H_c , oersteds	Residual induction B_r , gausses	Energy product BH_{max} , $\times 10^{-6}$	Method of fabrication†	Mechanical properties‡	Weight lb/in. ³
.....	1 Mn, 0.9 C	Q 800	300	50	10,000	.20	HR, M, P	H, S	.280
.....	5 W, 0.3 Mn, 0.7 C	Q 850	300	70	10,300	.32	HR, M, P	H, S	.292
.....	3.5 Cr, 0.9 C, 0.3 Mn	Q 830	300	65	9,700	.30	HR, M, P	H, S	.280
.....	17 Co, 0.75 C, 2.5 Cr, 8 W	—	1,000	150	9,500	.65	HR, M, P	H, S	—
.....	36 Co, 0.7 C, 4 Cr, 5 W	Q 950	1,000	240	9,500	.97	HR, M, P	H, S	.296
.....	17 Mo, 12 Co	Q 1200, B 700	1,000	250	10,500	1.1	HR, M, P	H	.295
.....	12 Al, 20 Ni, 5 Co	A 1200, B 700	2,000	440	7,200	1.4	C, G	H, B	.249
.....	10 Al, 17 Ni, 2.5 Co, 6 Cu	A 1200, B 600	2,000	550	7,200	1.6	C, G	H, B	.256
.....	10 Al, 17 Ni, 2.5 Co, 6 Cu	A 1300	2,000	520	6,900	1.4	Sn, G	H	.249
.....	12 Al, 28 Ni, 5 Co	Q 1200, B 650	3,000	700	5,500	1.3	Sn, C, G	H	.253
.....	8 Al, 14 Ni, 24 Co, 3 Cu	AF 1300, B 600	2,000	550	12,500	4.5	C, G	H, B	.264
.....	8 Al, 15 Ni, 24 Co, 3 Cu, 1 Ti	—	3,000	750	10,000	3.5	C, G	H, B	.268
.....	6 Al, 18 Ni, 35 Co, 8 Ti	—	3,000	950	5,800	1.5	C, G	H, B	.26
.....	52 Co, 10 V	B 600	1,000	300	8,800	1.0	C, CR, M, P	D	.295
.....	52 Co, 14 V	CW + B 600	2,000	510	10,000	3.5	C, CR, M, P	D	.292
.....	60 Cu, 20 Ni	CW + B 600	2,400	550	5,400	1.5	C, CR, M, P	D, M	.311
.....	50 Cu, 21 Ni, 29 Co	—	3,200	660	3,400	.80	C, CR, M, P	D, M	.300
.....	30 Fe ₂ O ₃ , 44 Fe ₃ O ₄ , 26 C ₂ O ₃	—	3,000	1,000	1,600	.60	Sn, G	W	.113
.....	86.8 Ag, 8.8 Mn, 4.4 Al	—	20,000	6,000 ^a	550	.075	C, CR, M, P	D, M	.325
.....	77 Pt, 23 Co	Q 1200, B 650	15,000	3,600	5,900	6.5	C, CR, M	D	—
.....	Fine powder	—	2,000	390	6,600	.97	—	—	.176

* given is intrinsic H_c .

† Quenched in oil or water. A—Air cooled. B—Baked. F—Cooled in magnetic field. CW—Cold worked.

‡ Hot rolled or forged. CR—Cold rolled or drawn. M—Machined. G—Must be ground. P—Punched. C—Cast. Sn—Sintered.

Hard. B—Brittle. S—Strong. D—Ductile. M—Malleable. W—Weak.

MAGNETIC SUSCEPTIBILITY OF THE ELEMENTS AND INORGANIC COMPOUNDS

The following table lists the magnetic susceptibilities of one gram formula weight of a number of paramagnetic and diamagnetic inorganic compounds as well as the magnetic susceptibilities of the elements.

In each instance the magnetic moment is expressed in cgs units.

A more extensive listing of the magnetic susceptibilities of inorganic compounds as well as those for organic compounds may be found in Constantes Selectionnees Diamagnetisme et Paramagnetisme Relaxation Paramagnetique, Volume 7. This table is abridged from the above publication by permission of the publishers.

Substance	Formula	Temp. °K.	Susceptibility 10^{-6} cgs	Substance	Formula	Temp. °K.	Susceptibility 10^{-6} cgs
Al	Al	ord.	+16.5	Barium (continued)			
AlF ₃	AlF ₃	302	+12.0	Bromide	BaBr ₂	ord.	-92.0
Al ₂ O ₃	Al ₂ O ₃	ord.	-13.4	BaBr ₂ ·2H ₂ O	BaBr ₂ ·2H ₂ O	ord.	-119.0
Al ₂ (SO ₄) ₃	Al ₂ (SO ₄) ₃	ord.	-37.0	Carbonate	Ba(CO ₃) ₂	ord.	-58.9
Al ₂ (SO ₄) ₃ ·18H ₂ O	Al ₂ (SO ₄) ₃ ·18H ₂ O	ord.	-93.0	Chlorate	Ba(ClO ₃) ₂	ord.	-87.5
NH ₃	NH ₃	ord.	-323.0	Chloride	BaCl ₂	ord.	-72.6
NH ₄	NH ₄	ord.	-18.0	BaCl ₂ ·2H ₂ O	BaCl ₂ ·2H ₂ O	ord.	-100.0
NH ₄ C ₂ H ₃ O ₂	NH ₄ C ₂ H ₃ O ₂	ord.	-17.0	Fluoride	BaF ₂	ord.	-51.0
NH ₄ Br	NH ₄ Br	ord.	-41.1	Hydroxide	Ba(OH) ₂	ord.	-53.2
(NH ₄) ₂ CO ₃	(NH ₄) ₂ CO ₃	ord.	-47.0	Iodate	Ba(OH) ₂ ·8H ₂ O	ord.	-157.0
NH ₄ ClO ₃	NH ₄ ClO ₃	ord.	-42.50	Iodide	Ba(IO ₃) ₂	ord.	-122.5
NH ₄ Cl	NH ₄ Cl	ord.	-42.1	BaI ₂	BaI ₂	ord.	-124.0
NH ₄ F	NH ₄ F	ord.	-36.7	BaI ₂ ·2H ₂ O	BaI ₂ ·2H ₂ O	ord.	-163.0
NH ₄ OH	NH ₄ OH	ord.	-23.0	Nitrate	Ba(NO ₃) ₂	ord.	-66.5
NH ₄ IO ₃	NH ₄ IO ₃	ord.	-31.5	Oxide	BaO	ord.	-29.1
NH ₄ I	NH ₄ I	ord.	-62.3	BaO ₂	BaO ₂	ord.	-40.6
NH ₄ NO ₃	NH ₄ NO ₃	ord.	-66.0	Sulfate	BaSO ₄	ord.	-71.3
(NH ₄) ₂ SO ₄	(NH ₄) ₂ SO ₄	ord.	-33.6	Beryllium (s)	Be	ord.	-9.0
NH ₄ SCN	NH ₄ SCN	ord.	-67.0	Chloride	BeCl ₂	ord.	-26.5
Am	Am	300	-48.1	Hydroxide	Be(OH) ₂	ord.	-23.1
Sb	Sb	293	+1000.0	Nitrate (aq)	Be(NO ₃) ₂	298	-41.0
SbBr ₃	SbBr ₃	ord.	-99.0	Oxide	BeO	ord.	-11.9
SbCl ₃	SbCl ₃	ord.	-2.5	Sulfate	BeSO ₄	ord.	-37.0
SbCl ₅	SbCl ₅	ord.	-115.0	Bismuth (s)	Bi	ord.	-280.1
SbF ₃	SbF ₃	ord.	-86.7	Bi	Bi	ord.	-10.5
SbI ₃	SbI ₃	ord.	-120.0	Bismuth (l)	Bi	ord.	-147.0
Sb ₂ O ₃	Sb ₂ O ₃	ord.	-46.0	Bromide	BiBr ₃	ord.	-26.5
Sb ₂ S ₃	Sb ₂ S ₃	ord.	-147.0	Chloride	BiCl ₃	ord.	+154.0
A	A	ord.	-69.4	Chromate	Bi ₂ (CrO ₄) ₃	ord.	-61.0
As	As	293	-86.0	Fluoride	BiF ₃	303	-65.8
AsBr ₃	AsBr ₃	ord.	-19.6	Hydroxide	Bi(OH) ₃	ord.	-200.5
AsCl ₃	AsCl ₃	ord.	-5.5	Iodide	BiI ₃	ord.	-91.0
AsI ₃	AsI ₃	ord.	-23.7	Nitrate	Bi(NO ₃) ₃	ord.	-159.0
As ₂ S ₃	As ₂ S ₃	ord.	-23.0	Oxide	Bi(NO ₃) ₃ ·5H ₂ O	ord.	-110.0
H ₂ AsO ₄	H ₂ AsO ₄	ord.	-106.0	BiO	BiO	ord.	-83.0
Ba	Ba	ord.	-79.9	Bi ₂ O ₃	Bi ₂ O ₃	ord.	-77.0
Ba(C ₂ H ₃ O ₂) ₂ ·H ₂ O	Ba(C ₂ H ₃ O ₂) ₂ ·H ₂ O	ord.	-142.0	Phosphate	BiPO ₄	ord.	-199.0
Ba(BrO ₃) ₂	Ba(BrO ₃) ₂	ord.	-70.0	Sulfate	Bi ₂ (SO ₄) ₃	ord.	-123.0
		ord.	-51.2	Sulfide	Bi ₂ S ₃	ord.	-34.1
		ord.	+20.6	Boric Acid	H ₂ BO ₃	ord.	-6.7
		ord.	-100.1	Boron (s)	B	ord.	-59.9
		ord.	-105.8	Chloride	BCl ₃	ord.	-39.0
				Oxide	B ₂ O ₃	ord.	-56.4
				Bromine (l)	Br ₂	ord.	-73.5
				Bromine (g)	Br ₂	ord.	-73.5