Note

1993 Table of Standard Atomic Weights abridged to Five Significant Figures*

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Introduction

The detail and the number of significant figures in the IUPAC Table of Standard Atomic Weights, as is found in the biennial reports of the Commission on Atomic Weights and Isotopic Abundances, published in *Pure and Applied Chemistry*, exceed the needs and interests of most users, who are more concerned with the length of time during which a given table has validity to the precision limit of their interests. The Commission on Atomic Weights and Isotopic Abundances in 1987, therefore, decided to prepare for publication a revised and updated version of the 1981 Table of Atomic Weights abridged to Five Significant Figures, or fewer where uncertainties do not warrant even five-figure accuracy (this currently applies to eight elements). When an atomic weight is known to more than five significant figures, it is abridged in this Table to the five-figure value closest to the unabridged best value. When the sixth digit of the unabridged value is 5 exactly, it is rounded up or down to make the fifth digit in this abridged Table even. The single-digit uncertainty in the tabulated atomic weight is held to be symmetric – that is, it is applicable with either a positive or a negative sign.

The abridged Table is here given with the reasonable hope that not even one of the quoted values will need to be changed because of every biennial revision of the unabridged Table, although the quoted uncertainties

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TABLE 1. Atomic weights, scaled to the relative atomic mass, $A_r(^{12}C) = 12$, are here quoted to five significant figures unless the dependable accuracy is more limited by either the combined uncertainties of the best published atomic-weight determinations, or by the variability of isotopic composition in normal terrestrial occurrences (the latter applies to elements **annotated r**). The last significant figure of each tabulated value is considered reliable to ±1 except when a larger single-digit uncertainty is inserted in parentheses following the atomic weight. Neither the highest nor the lowest actual atomic weight of any normal sample is thought likely to differ from the tabulated value by more than the assigned uncertainty. However, the tabulated values do not apply either to samples of highly exceptional isotopic composition arising from most unusual geological occurrences (for elements **annotated g**) or to those whose isotopic composition has been artificially altered. Such might even be found in commerce without disclosure of that modification (for elements **annotated m**). Elements annotated by an asterisk (*) have no stable isotope and are generally represented in this Table by just one of the element's commonly known radioisotopes, with a corresponding relative atomic mass in the atomic-weight column. However, three such elements (Th, Pa and U) do have a characteristic terrestrial isotopic composition, and for these an atomic weight is tabulated. For more detailed information users should refer to the full IUPAC Table of Standard Atomic Weights.

Name	Symbol	Atomic No.	Atomic Wt.	Annotations
Actinium*	^{227}Ac	89	227.03	
Aluminium	Al	13	26.982	
Americium*	^{241}Am	95	241.06	
Antimony (Stibium)	Sb	51	121.76	g
Argon	Ar	18	39.948	g r
Arsenic	As	33	74.922	
Astatine*	^{210}At	85	209.99	
Barium	Ba	56	137.33	
Berkelium*	^{249}Bk	97	249.08	
Beryllium	Be	4	9.0122	
Bismuth	Bi	83	208.98	
Boron	B	5	10.811(5)	g m r
Bromine	Br	35	79.904	
Cadmium	Cd	48	112.41	
Mercury	Hg	80	200.59(2)	
Molybdenum	Mo	42	95.94	g
Neodymium	Nd	60	144.24(3)	g
Neon	Ne	10	20.180	m
Neptunium*	^{237}Np	93	237.05	
Nickel	Ni	28	58.693	
Niobium	Nb	41	92.906	
Nitrogen	N	7	14.007	
Nobelium*	^{259}No	102	259.10	
Osmium	Os	76	190.23(3)	g
Oxygen	O	8	15.999	
Palladium	Pd	46	106.42	g
Phosphorus	P	15	30.974	
Platinum	Pt	78	195 08(3)	

(*continued*)

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TABLE 1. (*continued*)

Caesium	Cs	55	132.91			
Calcium	Ca	20	40 078(4)	g		
Californium*	^{252}Cf	98	252.08			
Carbon	C	6	12.011	g		r
Cerium	Ce	58	140.12	g		
Chlorine	Cl	17	35.453		m	
Chromium	Cr	24	51.996			
Cobalt	Co	27	58.933			
Copper	Cu	29	63 546(3)			r
Curium*	^{244}Cm	96	244.06			
Dysprosium	Dy	66	162.50(3)	g		
Einsteinium*	^{252}Es	99	252 08			
Erbium	Er	68	167.26(3)	g		
Europium	Eu	63	151 96	g		
Fermium*	^{257}Fm	100	257.10			
Fluorine	F	9	18 998			
Francium*	^{223}Fr	87	223.02			
Gadolinium	Gd	64	157.25(3)	g		
Gallium	Ga	31	69 723			
Germanium	Ge	32	72.61(2)			
Gold	Au	79	196.97			
Hafnium	Hf	72	178.49(2)			
Helium	He	2	4 0026			
Holmium	Ho	67	164 93			
Hydrogen	H	1	1 0079	g	m	
Indium	In	49	114 82			
Iodine	I	53	126.90			
Iridium	Ir	77	192 22			
Iron	Fe	26	55.845(2)			
Krypton	Kr	36	83 80	g	m	
Lanthanum	La	57	138.91			
Lawrencium*	^{262}Lr	103	262.11			
Lead	Pb	82	207 2	g		r
Lithium	Li	3	[6 941(2)]†	g	m	r
Lutetium	Lu	71	174 97	g		
Magnesium	Mg	12	24.305			
Manganese	Mn	25	54.938			
Mendelevium*	^{258}Md	101	258 10			
Plutonium*	^{239}Pu	94	239 05			
Polonium*	^{210}Po	84	209.98			
Potassium (Kalium)	K	19	39.098	g		
Praseodymium	Pr	59	140 91			
Promethium*	^{147}Pm	61	146.92			
Protactinium*	Pa	91	231.04			
Radium*	^{226}Ra	88	226 03			
Radon*	^{222}Rn	86	222 02			
Rhenium	Re	75	186.21			
Rhodium	Rh	45	102.91			
Rubidium	Rb	37	85.468			
Ruthenium	Ru	44	101.07(2)	g		
Samarium	Sm	62	150 36(3)	g		
Scandium	Sc	21	44.956			
Selenium	Se	34	78 96(3)			
Silicon	Si	14	28 086			
Silver	Ag	47	107 87			
Sodium (Natrium)	Na	11	22.990			
Strontium	Sr	38	87.62	g		r
Sulfur	S	16	32 066(6)	g		r
Tantalum	Ta	73	180 95			
Technetium*	^{99}Tc	43	98.906			
Tellurium	Te	52	127 60(3)	g		
Terbium	Tb	65	158 93			
Thallium	Tl	81	204.38			
Thorium*	Th	90	232 04	g		
Thulium	Tm	69	168 93			
Tin	Sn	50	118 71			
Titanium	Ti	22	47.867			
Tungsten (Wolfram)	W	74	183 84			
Uranium*	U	92	238 03	g	m	
Vanadium	V	23	50 942			
Xenon	Xe	54	131 29(2)	g	m	
Ytterbium	Yb	70	173.04(3)	g		
Yttrium	Y	39	88 906			
Zinc	Zn	30	65 39(2)			
Zirconium	Zr	40	91 224(2)	g		

†Commercially available lithium materials have atomic weights that range between 6.94 and 6.99; if a more accurate value is required, it must be determined for the specific material.

may have to be altered. Moreover, any change in an abridged value will probably be by only one unit in the last significant figure or by adding a fifth significant figure where only four can be given now. Such constancy in these values is desirable for textbooks and numerical tables derived from atomic-weight data. However, it should be remembered that the best atomic-weight values of 27 elements are still uncertain by more than one unit in the fifth significant figure. The annotated warnings of anomalous geological occurrences, isotopically altered materials, and variability of radioactive elements are relevant even in the abridged Table. The footnote concerning lithium is particularly important.