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Report of the Committee on Atomic Weights of the American Chemical Society

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The Commission on Atomic Weights of the International Union of Chemistry, at its meeting at Amsterdam in September, 1949, changed only one value in the 1947 table of Atomic Weights. This was the value for beryllium, which was revised from 9.02 to 9.013, largely on the basis of the work of Hönigschmid and Johannsen [*Z. Naturforschung*, **1**, 650 (1946); *Z. anorg. Chem.*, **253**, 228 (1947)], which was described in a previous report of the American Chemical Society's Committee on Atomic Weights [G. E. F. Lundell, THIS JOURNAL, **70**, 3531 (1948)]. However, it was decided that the official table should carry the names, symbols, and atomic weights or selected mass numbers, of the ten elements which have not appeared in earlier tables. Two of these, element numbers 84 and 89, have long been known as the relatively rare natural radioactive elements polonium and actinium. Four, atomic numbers 43, 61, 85 and 87, are elements whose discovery had been reported previously but disputed. The remaining four are the transuranium elements, Nos. 93 to 96, whose discoveries were first announced in recent years. For these four elements, as well as for Nos. 43, 61, 85 and 87, names and symbols were adopted for the first time by the Council of the International Union, on the basis of recommendations of the Union's Commission on Inorganic Nomenclature. The names and symbols are:

Atomic number	Name	Symbol
43	Technetium	Tc
61	Promethium	Pm
85	Astatine	At
87	Francium	Fr
93	Neptunium	Np
94	Plutonium	Pu
95	Americium	Am
96	Curium	Cm

Since the Union had formally recognized eight new elements, it was necessary for the Commission on Atomic Weights to include them in the table and to determine what weights should be assigned to them. With these elements included, it was appropriate also to include polonium and actinium, and thus to present, for the first time, a complete table of the elements through No. 96.

Of the eight newly recognized elements, seven were named on the basis of their production in the laboratory, rather than their discovery in nature. Because these elements will be encountered only as artificial products their atomic weights will depend upon the methods by which they are produced. Since a true atomic weight is a property of an element as it occurs in nature, either as a single isotopic species or as a mixture of isotopes of substantially constant composition, it was considered incorrect to assign atomic weights to the seven "artificial" elements. For each of these elements it was decided to list, instead, the mass number of the most stable known isotope. To prevent confusion of mass numbers with atomic weights, the former were to be inclosed with brackets. The recognition of francium, No. 87, by the International Union of Chemistry, was based on its observation in nature as a member of the actinium series [M. Perey, *Compt. rend.*, **208**, 97 (1939)]. However, the isotope in question has such a short half-life (twenty-one minutes) that it seemed better to include the element with those to be assigned mass numbers rather than atomic weights.

The International Union of Chemistry, at the Amsterdam conference, also recommended the adoption of a single name for three elements heretofore differently named in different countries. It was recommended that the element known in the United States as beryllium, but in some European countries as glucinium, should

henceforth bear the former name. For the element known in the United States as columbium, the European designation of niobium was recommended. Similarly, tungsten, if the International Union's recommendation is followed, will become wolfram. The 1949 table of atomic weights, which follows, uses the names and symbols of the elements adopted by the Union. However, as a concession to the fact that the new names are still unfamiliar in the United States (and may not find acceptance there) the old names columbium and tungsten are given also, in their respective alphabetical positions. It may be noted that two changes in spelling have been adopted—lutetium instead of lutecium, and protactinium instead of protoactinium.

INTERNATIONAL ATOMIC WEIGHTS

1949

	Symbol	Atomic number	Atomic weight[a]
Actinium	Ac	89	227
Aluminum	Al	13	26.97
Americium	Am	95	[241]
Antimony	Sb	51	121.76
Argon	A	18	39.944
Arsenic	As	33	74.91
Astatine	At	85	[210]
Barium	Ba	56	137.36
Beryllium	Be	4	9.013
Bismuth	Bi	83	209.00
Boron	B	5	10.82
Bromine	Br	35	79.916
Cadmium	Cd	48	112.41
Calcium	Ca	20	40.08
Carbon	C	6	12.010
Cerium	Ce	58	140.13
Cesium	Cs	55	132.91
Chlorine	Cl	17	35.457
Chromium	Cr	24	52.01
Cobalt	Co	27	58.94
Columbium (see Niobium)			
Copper	Cu	29	63.54
Curium	Cm	96	[242]
Dysprosium	Dy	66	162.46
Erbium	Er	68	167.2
Europium	Eu	63	152.0
Fluorine	F	9	19.00
Francium	Fr	87	[223]
Gadolinium	Gd	64	156.9
Gallium	Ga	31	69.72
Germanium	Ge	32	72.60
Gold	Au	79	197.2
Hafnium	Hf	72	178.6
Helium	He	2	4.003
Holmium	Ho	67	164.94
Hydrogen	H	1	1.0080
Indium	In	49	114.76
Iodine	I	53	126.92
Iridium	Ir	77	193.1
Iron	Fe	26	55.85
Krypton	Kr	36	83.7
Lanthanum	La	57	138.92
Lead	Pb	82	207.21
Lithium	Li	3	6.940
Lutetium	Lu	71	174.99
Magnesium	Mg	12	24.32
Manganese	Mn	25	54.93
Mercury	Hg	80	200.61
Molybdenum	Mo	42	95.95
Neodymium	Nd	60	144.27
Neptunium	Np	93	[237]
Neon	Ne	10	20.183
Nickel	Ni	28	58.69
Niobium	Nb	41	92.91
Nitrogen	N	7	14.008
Osmium	Os	76	190.2
Oxygen	O	8	16.0000
Palladium	Pd	46	106.7
Phosphorus	P	15	30.98
Platinum	Pt	78	195.23
Plutonium	Pu	94	[239]
Polonium	Po	84	210
Potassium	K	19	39.096
Praseodymium	Pr	59	140.92
Promethium	Pm	61	[147]
Protactinium	Pa	91	231
Radium	Ra	88	226.05
Radon	Rn	86	222
Rhenium	Re	75	186.31
Rhodium	Rh	45	102.91
Rubidium	Rb	37	85.48
Ruthenium	Ru	44	101.7
Samarium	Sm	62	150.43
Scandium	Sc	21	45.10
Selenium	Se	34	78.96
Silicon	Si	14	28.06
Silver	Ag	47	107.880
Sodium	Na	11	22.997
Strontium	Sr	38	87.63
Sulfur	S	16	32.066
Tantalum	Ta	73	180.88
Technetium	Tc	43	[99]
Tellurium	Te	52	127.61
Terbium	Tb	65	159.2
Thallium	Tl	81	204.39
Thorium	Th	90	232.12
Thulium	Tm	69	169.4
Tin	Sn	50	118.70
Titanium	Ti	22	47.90
Tungsten (see Wolfram)			
Uranium	U	92	238.07
Vanadium	V	23	50.95
Wolfram	W	74	183.92
Xenon	Xe	54	131.3
Ytterbium	Yb	70	173.04
Yttrium	Y	39	88.92
Zinc	Zn	30	65.38
Zirconium	Zr	40	91.22

[a] A value given in brackets denotes the mass number of the most stable known isotope.

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