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ANNUAL REPORT OF THE INTERNATIONAL COMMITTEE ON ATOMIC WEIGHTS, 1917.

The following new determinations of Atomic Weights have been published since the issue of the last Annual Report:

Hydrogen.—Burt and Edgar[1] conclude from a long series of experiments that the ratio of the combining volumes of hydrogen and oxygen is represented with a high degree of probability by the figure 2.00288 at 0° and 760 mm. pressure. Assuming Morley's values for the densities of hydrogen and oxygen, namely 0.089873 and 1.42900, respectively, the atomic weight of hydrogen is found to be 1.00772. This new value for H is very nearly the arithmetic mean of the independent values obtained by Morley and Noyes. It may be taken, therefore, that the true value for H lies very close to 1.0077.

Zinc.—Baxter and Grose,[2] by the electrolysis of zinc bromide, find Zn = 65.388.

Cadmium.—Baxter, Grose and Hartmann,[3] by the electrolysis of cadmium bromide, find Cd = 112.407. Similar analyses of the chloride gave Cd = 112.413. Oechsner de Coninck and Gérard,[4] by reducing cadmium carbonate to metal, found Cd = 112.32.

[1] *Phil. Trans.*, **216**, 393 (1916).
[2] THIS JOURNAL, **38**, 868 (1916).
[3] *Ibid.*, **38**, 857 (1916).
[4] *Compt. rend.*, **161**, 676 (1915).

Lead.—Hönigschmid and Horovitz,[1] by analyses of the chloride, found for common lead the value Pb = 207.180. Similar analyses of radioactive lead chloride from various sources gave atomic weight values ranging from 206.050 to 206.084.

INTERNATIONAL ATOMIC WEIGHTS, 1917.

	Symbol.	Atomic weight.		Symbol.	Atomic weight.
Aluminum	Al	27.1	Molybdenum	Mo	96.0
Antimony	Sb	120.2	Neodymium	Nd	144.3
Argon	A	39.88	Neon	Ne	20.2
Arsenic	As	74.96	Nickel	Ni	58.68
Barium	Ba	137.37	Niton (radium emanation)	Nt	222.4
Bismuth	Bi	208.0	Nitrogen	N	14.01
Boron	B	11.0	Osmium	Os	190.9
Bromine	Br	79.92	Oxygen	O	16.00
Cadmium	Cd	112.40	Palladium	Pd	106.7
Caesium	Cs	132.81	Phosphorus	P	31.04
Calcium	Ca	40.07	Platinum	Pt	195.2
Carbon	C	12.005	Potassium	K	39.10
Cerium	Ce	140.25	Praseodymium	Pr	140.9
Chlorine	Cl	35.46	Radium	Ra	226.0
Chromium	Cr	52.0	Rhodium	Rh	102.9
Cobalt	Co	58.97	Rubidium	Rb	85.45
Columbium	Cb	93.1	Ruthenium	Ru	101.7
Copper	Cu	63.57	Samarium	Sa	150.4
Dysprosium	Dy	162.5	Scandium	Sc	44.1
Erbium	Er	167.7	Selenium	Se	79.2
Europium	Eu	152.0	Silicon	Si	28.3
Fluorine	F	19.0	Silver	Ag	107.88
Gadolinium	Gd	157.3	Sodium	Na	23.00
Gallium	Ga	69.9	Strontium	Sr	87.63
Germanium	Ge	72.5	Sulfur	S	32.06
Glucinum	Gl	9.1	Tantalum	Ta	181.5
Gold	Au	197.2	Tellurium	Te	127.5
Helium	He	4.00	Terbium	Tb	159.2
Holmium	Ho	163.5	Thallium	Tl	204.0
Hydrogen	H	1.008	Thorium	Th	232.4
Indium	In	114.8	Thulium	Tm	168.5
Iodine	I	126.92	Tin	Sn	118.7
Iridium	Ir	193.1	Titanium	Ti	48.1
Iron	Fe	55.84	Tungsten	W	184.0
Krypton	Kr	82.92	Uranium	U	238.2
Lanthanum	La	139.0	Vanadium	V	51.0
Lead	Pb	207.20	Xenon	Xe	130.2
Lithium	Li	6.94	Ytterbium (Neoytterbium)	Yb	173.5
Lutecium	Lu	175.0	Yttrium	Yt	88.7
Magnesium	Mg	24.32	Zinc	Zn	65.37
Manganese	Mn	54.93	Zirconium	Zr	90.6
Mercury	Hg	200.6			

[1] *Monatsh.*, **36**, 355 (1915).

Bismuth.—Oeschsner de Coninck and Gérard,[1] by reduction of bismuth chloride to metal, found Bi = 208.50.

Molybdenum.—Müller,[2] by oxidation of the metal, found Mo = 96.035.

Neodymium.—Baxter, Whitcomb, Stewart, and Chapin,[3] by analyses of the chloride, find Nd = 144.27.

Columbium.—Smith and Van Haagen,[4] from the ratio between sodium columbate ($NaCbO_3$) and sodium chloride, find Cb = 93.13. The value 93.1 might be adopted in the table.

Argon.—Schultze[5] has redetermined the density of argon. The corresponding atomic weight is A = 39.945.

Signed, F. W. CLARKE,
T. E. THORPE,
G. URBAIN.

NOTE.—Because of the European war the Committee has had much difficulty in the way of correspondence. The German member, Professor Ostwald, has not been heard from in connection with this report. Possibly the censorship of letters, either in Germany or *en route*, has led to a miscarriage. F. W. CLARKE, *Chairman.*

[CONTRIBUTION FROM RESEARCH LABORATORY OF THE GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.]

THE CONSTITUTION AND FUNDAMENTAL PROPERTIES OF SOLIDS AND LIQUIDS.

PART I. SOLIDS.

BY IRVING LANGMUIR.

Received September 5, 1916.

The importance of the work of W. H. Bragg and W. L. Bragg in its bearing on chemistry has not, as yet, been generally recognized. In hearing two of W. H. Bragg's lectures in this country a few years ago, the writer was impressed with the very great significance of this work in the field of chemistry. The structure of crystals as found by the Braggs leads to new and more definite conceptions as to the nature of chemical forces.

The writer has constantly endeavored to apply this new conception in his work on heterogeneous reactions and particularly in connection with a study of the phenomena of adsorption and surface tension. In this way he has gradually been led to form more or less definite theories of the mechanism of evaporation, condensation, liquefaction, adsorption, and capillary phenomena. According to this theory, both solids and liquids

[1] *Compt. rend.*, **162**, 252 (1916).
[2] THIS JOURNAL, **37**, 2046 (1915).
[3] *Ibid.*, **38**, 302 (1916).
[4] *Ibid.*, **38**, 1783 (1916).
[5] *Ann. Physik*, [iv] **48**, 269 (1915).