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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 Edgar¹ 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.—Oeschner 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.—Schultze⁵ 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).