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REPORT OF THE INTERNATIONAL COMMITTEE ON ATOMIC WEIGHTS FOR 1921-22.

A few new determinations of atomic weight have appeared since the publication of our last report. They are, briefly, as follows.

Aluminum.—Richards and Krepelka,[1] from analyses of aluminum bromide, find Al = 26.963 when Br = 79.916. This value, rounded off to 27.0, should replace the older figure.

Bismuth.—Hönigschmid,[2] from a long series of analyses of the chloride, find Bi = 209.013. Classen and Ney,[3] by conversion of bismuth triphenyl, $Bi(C_6H_5)_3$ into Bi_2O_3, find Bi = 208.9967. The two values, obtained by very different methods, are in good agreement, and the value 209 may safely be adopted.

Thulium.—James and Stewart[4] have determined the ratio $TmCl_3$ to 3Ag, which gives Tm = 169.9. This value, as obtained by a good method, should replace the figure now in use which was not supported by detailed evidence. It seems to have been only a preliminary determination which does not claim to be final.

Nickel.—In 1915 Baxter and Parsons published a preliminary comparison of the atomic weights of terrestrial and meteoric nickel, which

[1] Richards and Krepelka, THIS JOURNAL, **42**, 2221 (1920).

[2] Hönigschmid, *Z. Elektrochem.*, **26**, 403 (1920).

[3] Classen and Ney, *Ber.*, **53**, 2267 (1921).

[4] James and Stewart, THIS JOURNAL, **42**, 2022 (1920).

was noted in the report of the committee shortly afterwards. They have now published their complete paper[5] and give the following values: terrestrial nickel, Ni = 58.702; meteoric nickel, Ni = 58.685. The agreement is very close, and within the range of variation ascribable to experimental errors.

INTERNATIONAL ATOMIC WEIGHTS, 1921–22.

	Symbol.	Atomic weight.		Symbol.	Atomic weight.
Aluminum	Al	27.0	Molybdenum	Mo	96.0
Antimony	Sb	120.2	Neodymium	Nd	144.3
Argon	A	39.9	Neon	Ne	20.2
Arsenic	As	74.96	Nickel	Ni	58.68
Barium	Ba	137.37	Niton (radium emanation)	Nt	222.4
Bismuth	Bi	209.0	Nitrogen	N	14.008
Boron	B	10.9	Osmium	Os	190.9
Bromine	Br	79.92	Oxygen	O	16.00
Cadmium	Cd	112.40	Palladium	Pd	106.7
Calcium	Ca	40.07	Phosphorus	P	31.04
Carbon	C	12.005	Platinum	Pt	195.2
Cerium	Ce	140.25	Potassium	K	39.10
Cesium	Cs	132.81	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	45.1
Erbium	Er	167.7	Selenium	Se	79.2
Europium	Eu	152.0	Silicon	Si	28.1
Fluorine	F	19.0	Silver	Ag	107.88
Gadolinium	Gd	157.3	Sodium	Na	23.00
Gallium	Ga	70.1	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	232.15
Indium	In	114.8	Thulium	Tm	169.9
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	89.33
Magnesium	Mg	24.32	Zinc	Zn	65.37
Manganese	Mn	54.93	Zirconium	Zr	90.6
Mercury	Hg	200.6			

[5] Baxter and Parsons, THIS JOURNAL, 43, 507 (1921).

In addition to the changes noted above, the value for silicon due to Baxter, Weatherill and Holmes, which was cited in our last report, namely, Si = 28.111 may be adopted now and rounded off to 28.1.

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[CONTRIBUTION FROM THE CHEMICAL LABORATORY OF THE UNIVERSITY OF WASHINGTON.]

SOLUBILITIES IN MIXTURES OF TWO SOLVENTS.

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In a recent paper[1] by one of us on solubilities in mixtures of water and pyridine, it was stated[2] that more extensive and accurate solubility studies of pyridine, quinoline, etc. are to be made, also efforts will be made to prepare the molecular compounds indicated. This paper includes studies of solubilities both in mixtures of water and pyridine and in mixtures of alcohol and quinoline; and the molecular compound $C_9H_7N.3CO(NH_2)_2$, indicated by the curve of solubilities of urea in the alcohol-quinoline mixtures, was isolated and studied.

Although constants of solubility are the most numerous and useful of chemical data, and although solutions themselves afford the media of the vast majority of chemical reactions, little is accurately known concerning either the nature of solutions or the mechanism of chemical reactions in solutions. It is true that the nature of solutions has been studied deeply from the standpoints of the phase rule, the kinetic theory, and the ionic theory, yet it can scarcely be held that the intimate nature of solvent and solute has thereby been elucidated. Cryoscopic and ebullioscopic methods have recently demonstrated the frequent existence in solution of molecular compounds aggregated of the solvent and the solute, and other physical methods have confirmed these demonstrations, but all methods failed, except rarely, to yield the molecular compound itself.

In the present and the earlier paper, the existence of the molecular compound is not only indicated by the solubility curve but the method of mixed solvents can yield the molecular compound itself. For these reasons, and because the method possesses simplicity and ease of application, it is planned to undertake other investigations with mixed solvents, the main objects of which are to study the general problem of solubility, to demonstrate that curved or broken lines of solubility indicate the formation of molecular compounds, and to separate the molecular compounds when possible.

[1] THIS JOURNAL, 39, 1399 (1917).
[2] *Ibid.*, 39, 1404 (1917).