First Report of the Committee on Atomic Weights of the International Union of Chemistry.

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IN September, 1930, at the meeting of the International Union of Pure and Applied Chemistry at Liége, the Committee on Elements which has functioned since 1923 was replaced by three committees, on (1) Atomic Weights, (2) Atoms, including isotopy and atomic structure, and (3) Radioactive Constants. Hereafter the function of the first of these committees will be to prepare annually a table of atomic weights on the basis of the most recent evidence. National Committees on Atomic Weights are requested by the International Union to refrain from publishing tables of their own.

While it was impossible for the new committee to issue a report earlier this year, it is the intention of the committee normally to issue its report so far as possible in the first (January) number of current chemical and physical periodicals. These reports will cover the twelve months from October to September preceding.

Authors of papers bearing on the subject are requested to send copies to each of the five members of this committee at the earliest possible moment.

Since the reports of the German and American committees (*Ber.*, 1930, **63**, *B*, 1; *J. Amer. Chem. Soc.*, 1930, **52**, 857) adequately cover the ground of progress during 1929, only investigations published since January 1st, 1930, are reviewed in this report.

Batuecas, Schlatter, and Maverick (*J. Chim. physique*, 1930, **27**, 36, 45) have published new determinations of $(PV)_0/(PV)$, by the expansion method. In column I the assumption is made that the quantity varies linearly with the pressure; in column II an equation of the second degree is used.

	I.	II.
N_2	1·0040	
NH_3	1·01543	1·01515
HCl	1·00787	1·00737
CO	1·00048	
H_2S	1·01031	1·01035

Nitrogen.—Moles and Batuecas (*Anal. Fís. Quím.*, 1930, **28**, 871) have redetermined the density of ammonia at various pressures. The gas was prepared (1) from ammonium oxalate and potassium hydroxide, (2) by synthesis (technical) from the elements, and (3) by hydrolysis of magnesium nitride. After chemical purification, and in most cases drying finally with phosphorus pentoxide, the gas was fractionally distilled. After correction for adsorption on the walls of the globes, the results are expressed in the weight of the litre at 0° and 760 mm.

Method of preparation.	Globe No. 3, 773 ml.	Globe No. 2, 647 ml.	Globe G, 1007 ml.	Average.
		1 Atmosphere.		
		Preliminary series.		
1	0·77167	0·77196		0·7718
	0·77234	0·77184		0·7721
	0·77226	0·77207		0·7722
	0·77137	0·77219		0·7718
Average	0·77191	0·77202		0·7720
		Final series.		
	0·77174	0·77130		0·77152
	0·77168	0·77190		0·77179
	0·77113	0·77158		0·77136
	0·77160	0·77168		0·77164
		0·77166		0·77166
	0·77170	0·77149		0·77160
	0·77184	0·77212		0·77198
Average	0·77162	0·77168		0·77165
2	0·77118	0·77185		0·77152
	0·77153	0·77207		0·77180
	0·77180	0·77119		0·77149
	0·77144	0·77188		0·77166
	0·77161	0·77193		0·77177
Average	0·77151	0·77178		0·77165
3			0·77169	0·77169
			0·77165	0·77165
	0·77195		0·77193	0·77194
	0·77168		0·77170	0·77169
	0·77187		0·77206	0·77197
Average	0·77183		0·77181	0·77179
Average of all	0·77163	0·77172	0·77181	0·77169
1		2/3 Atmosphere.		
	0·76758		0·76763	0·76761
	0·76734		0·76773	0·76754
	0·76839		0·76842	0·76841
	0·76803		0·76844	0·76824
Average	0·76784		0·76806	0·76795
2	0·76754	0·76770		0·76762
	0·76770			0·76770
	0·76752	0·76769		0·76761
Average	0·76759	0·76770		0·76764
3	0·76743		0·76729	0·76736
	0·76737		0·76758	0·76748
Average	0·76740		0·76744	0·76742
Average of all	0·76736	0·76770	0·76785	0·76773
		1/2 Atmosphere.		
1	0·76511		0·76624	0·76568
	0·76623		0·76597	0·77610
	0·76586		0·76557	0·76572
Average	0·76573		0·76593	0·76583
2	0·76592		0·76606	0·76599
	0·76582		0·76592	0·76587
Average	0·76587		0·76599	0·76593
3		0·76539		0·76539
	0·76641			0·76641
	0·76577	0·76561		0·76569
	0·76610	0·76593		0·76602
	0·76605	0·76541		0·76573
Average	0·76608	0·76559		0·76585
Average of all	0·76592	0·76559	0·76595	0·76585

		1/3 Atmosphere.		
Method of preparation.	Globe No. 3, 773 ml.	Globe No. 2, 647 ml.	Globe G, 1007 ml.	Average.
1	0·76328		0·76321	0·76325
	0·76378		0·76341	0·76360
	0·76395		0·76434	0·76415
Average	0·76367		0·76365	0·76366
2	0·76424		0·76314	0·76369
			0·76348	0·76348
	0·76400		0·76403	0·76402
	0·76416		0·76260	0·76416
	0·76444		0·76387	0·76416
	0·76387		0·76360	0·76374
Average	0·76418		0·76362	0·76390
3	0·76391			
	0·76438			
	0·76342			
	0·76350			
	0·76405		0·76426	0·76416
Average	0·76385		0·76426	0·76392
Average of all	0·76392		0·76370	0·76383

From the densities at various pressures the limiting density of ammonia is calculated by the method of differences to be 0·75990. The corresponding molecular weight of ammonia is then 17·032, and the atomic weight of nitrogen 14·009.

Phosphorus.—Ritchie (*Proc. Roy. Soc.*, 1930, *A*, **128**, 551) has determined the density of phosphine at different pressures. The gas was prepared from phosphonium iodide by means of potassium hydroxide and was fractionated.

P, atm.	Globe I, 336 ml.	Globe II, 341 ml.	Average.
1	(1·5311)	1·5308	1·5308
	1·5308	1·5307	1·5308
	1·5307	1·5305	1·5306
	1·5307	1·5307	1·5307
	1·5308	1·5308	1·5308
	1·5306		1·5306
Average	1·5307	1·5307	1·5307
0·75	1·5274	1·5272	1·5273
		1·5273	1·5273
	1·5271	1·5272	1·5272
Average	1·5273	1·5272	1·5272
0·50	1·5241	1·5237	1·5239
	1·5242		1·5242
	1·5237	1·5236	1·5237
	1·5233	1·5238	1·5236
	1·5238	1·5238	1·5238
Average	1·5238	1·5237	1·5238
0·25	1·5204	1·5202	1·5203
	1·5202	1·5203	1·5203
		1·5201	1·5201
	1·5205	1·5205	1·5205
Average	1·5204	1·5203	1·5203

Assuming a linear relation between PV and pressure, $(PV)_0/(PV)_1$ is calculated to be 1·0091.

If the normal litre of oxygen weighs 1·4290 g. and the coefficient of deviation from Boyle's law per atmosphere is − 0·00096, then PH_3 = 34·000 and P = 30·977. This value for phosphorus is appreciably lower than the chemical value.

Sulphur.—Hönigschmid and Sachtleben (*Z. anorg. Chem.*, 1931, **195**, 207) have completed a synthesis of silver sulphide from its elements. The compound was stable up to 300° but lost sulphur by decomposition above this temperature when reheated in sulphur vapour. Partially decomposed sulphide takes up quantitatively the deficiency in sulphur. Excess sulphur is given up at 300°. To carry out a synthesis, weighed quantities of the purest silver were heated in sulphur vapour until the reaction was complete and then the excess of sulphur was eliminated in a current of pure nitrogen at 280°. Constancy in weight of the sulphide was readily attained. The sulphur was prepared by precipitation from thiosulphate and double distillation in vacuum. Weights are corrected to vacuum. In the twelfth analysis the materials of the eleventh were reweighed in exhausted receptacles.

The Atomic Weight of Sulphur.

Wt. of Ag.	Wt. of Ag_2S.	Ratio, Ag_2S : 2Ag.	At. wt. of sulphur.
7·90291	9·07742	1·148617	32·066
9·42181	10·82209	1·148621	32·066
9·74522	11·19355	1·148620	32·066
9·59836	11·02489	1·148622	32·067
9·20378	10·57166	1·148622	32·067
10·75224	12·35021	1·148617	32·066
8·28317	9·51424	1·148623	32·067
9·86327	11·32913	1·148618	32·066
10·43748	11·98871	1·148621	32·066
7·21091	8·28265	1·148627	32·068
9·84440	11·30749	1·148621	32·067
9·84439	11·30748	1·148622	32·067
	Average	1·148621	32·067

Since all recent determinations of the atomic weight of sulphur have yielded a value not far from 32·06, this value has been adopted for the table.

Chlorine.—Scott and Johnson (*J. Amer. Chem. Soc.*, 1930, **52**, 3586) call attention to an error in the solubility of silver chloride at 0° assumed by Hönigschmid and Chan (*Z. anorg. Chem.*, 1927, **163**, 315) in their syntheses of silver chloride which amounts to 0·002% in the weight of silver chloride.

Calcium.—Hönigschmid and Kempter (*Z. anorg. Chem.*, 1931, **195**, 1) purified calcium nitrate from marble by 10 recrystallisations, and converted the product into chloride by precipitation of the carbonate and solution of the latter in hydrochloric acid (Sample I). Sample II was prepared from commercial nitrate by 15 crystallisations. After recrystallisation of the chloride it was prepared for weighing by dehydration and fusion in hydrogen chloride, and allowed to solidify in nitrogen. The solutions of the weighed chloride were corrected for deviations from the neutral point by titration with $N/100$-solutions of acid and base, and then were compared with silver in the usual way, and the silver chloride was collected and weighed. Weights are corrected to vacuum.

Atomic Weight of Calcium.

Sample.	Wt. of $CaCl_2$.	Wt. of Ag.	Ratio, $CaCl_2 : 2Ag$.	At. wt. of calcium.
I	1·84526	3·58692	0·514441	40·082
I	1·62314	3·15509	0·514451	40·084
I	1·42216	2·76444	0·514447	40·083
I	2·21933	4·31400	0·514448	40·083
I	1·03950	2·02064	0·514441	40·082
I	1·45783	2·83364	0·514472	40·088
II	2·93786	5·71052	0·514464	40·086
II	2·45368	4·76952	0·514451	40·084
II	2·11276	4·10689	0·514441	40·082
		Average	0·514451	40·084

Sample.	Wt. of $CaCl_2$.	Wt. of AgCl.	Ratio, $CaCl_2 : 2AgCl$.	At. wt. of calcium.
I	1·97942	5·11225	0·387191	40·083
I	2·35393	6·07937	0·387199	40·086
I	1·67385	4·32284	0·387210	40·089
I	1·62314	4·19217	0·387183	40·082
I	1·42216	3·67297	0·387196	40·085
I	2·21933	5·73153	0·387214	40·090

Sample.	Wt. of $CaCl_2$.	Wt. of AgCl.	Ratio, $CaCl_2 : 2Ag$.	At. wt. of calcium.
II	1·03950	2·68467	0·387198	40·086
II	1·45785	3·76499	0·387206	40·088
		Average	0·387200	40·086

The average of both series, 40·085, is slightly higher than that found earlier by Richards and Hönigschmid, *viz.*, 40·071. For the present, 40·08 is recommended. A. V. Frost and O. Frost (*Nature*, 1930, **125**, 48) claim to have discovered a concentration of Ca^{41} in a potassium felspar containing 0·042% of calcium oxide. Only 0·15 g. of calcium oxide was available. From the ratio $CaCl_2 : CaBr_2$ the atomic weight of calcium was found in two experiments to be 40·23. Similar experiments with ordinary calcium which had been purified in the same way gave 40·10.

Hönigschmid and Kempter (*Z. anorg. Chem.*, 1931, **195**, 1) attacked the same problem with calcium extracted from sylvine by von Hevesy. After preliminary purification the average atomic weight through the chloride was found to be 40·22. Spectroscopic investigation, however, revealed the presence of strontium. After removal of this impurity by fractional precipitation of the oxalate, the observed atomic weight was lowered to 40·093. The material still contained 0·015 atom % of strontium, so that the value to be expected is 40·091. Since the sylvine is a geologically younger mineral than the felspar, a smaller concentration of Ca^{41} is to be expected, so the question as to appreciable variation of Ca^{41} in nature is still an open one.

Vanadium.—Scott and Johnson (*J. Amer. Chem. Soc.*, 1930, **52**, 2638) have analysed vanadyl trichloride. This was made by heating purified vanadium trioxide in a current of chlorine, and the product was purified by vacuum distillation, after removal of excess chlorine with mercury and sodium. Portions for analysis were removed in sealed glass bulbs in the later stages of the distillation. After being weighed, the bulbs were broken under either nitric acid or ammonia. In the former case the glass was washed with nitric acid and collected on a filter. In the latter, after the supernatant liquid had been filtered, the precipitate was dissolved in nitric acid and the glass was washed and collected. The solutions were then compared with silver in the usual way, and in some cases the silver chloride was collected. The analyses are arranged in the order of decreasing volatility of the chloride samples. Weights are corrected to vacuum.

The Atomic Weight of Vanadium.

Wt. of $VOCl_3$.	Wt. of Ag.	Ratio, $VOCl_3$: 3Ag.	At. wt. of vanadium.	Wt. of AgCl.	Ratio, $VOCl_3$: 3AgCl.	At. wt. of vanadium.
			Acid hydrolysis.			
8·15697	15·23143	0·535535	50·950	20·23483	0·403115	50·973
8·29538	15·48986	0·535536	50·950	20·57872	0·403105	50·969
7·60527	14·20111	0·535541	50·951	18·86755	0·403087	50·961
7·01143	13·09218	0·535543	50·952			
	Average	0·535539	50·951		0·403102	50·968
			Alkaline hydrolysis.			
7·75120	14·47384	0·535532	50·949			
7·88453	14·72386	0·535493	50·936	19·56218	0·403050	50·945
9·19783	17·17614	0·535500	50·938	22·81924	0·403073	50·955
6·69572	12·50344	0·535510	50·941			
8·04970	15·03136	0·535527	50·947	19·96976	0·403094	50·964
7·62984	14·24666	0·535553	50·955			
	Average	0·535519	50·945		0·403072	50·955

Experimental evidence was found that the nephelometric end-point was slightly affected by the presence of vanadic acid, but the effect on the atomic weight of vanadium is less than 0·005. The average of the comparisons with silver, 50·948, agrees almost exactly with the recent results obtained by McAdam, and by Briscoe and Little.

Chromium.—Gonzales (*Anal. Fís. Quím.*, 1930, **28**, 579) has applied to chromyl chloride the recently developed method of preparing volatile inorganic compounds by fractional distillation in vacuum. The compound was prepared by the action of concentrated sulphuric acid on a mixture of sodium chloride and potassium dichromate and, after fractional distillation under low pressure, was collected in sealed glass bulbs. The bulbs were broken under water and the halogen was determined by comparison with silver in the usual way. Ultimately the silver chloride was determined. Weights are corrected to vacuum.

The Atomic Weight of Chromium.

Wt. of CrO_2Cl_2.	Wt. of Ag.	Ratio, CrO_2Cl_2 : 2Ag.	At. wt. of chromium.	Wt. of AgCl.	Ratio, CrO_2Cl_2 : 2AgCl.	At. wt. of chromium.
9·56543	13·32143	0·718049	52·012	17·69786	0·540485	52·029
9·54415	13·29120	0·718080	52·019	17·65929	0·540640	52·022
	Average	0·718085	52·016		0·540473	52·026

The average result, 52·02, is only 0·01 unit higher than the current one, and no change is recommended for the present.

Arsenic.—Krepelka (*Coll. Trav. chim. Czechoslov.*, 1930, **2**, 255) has published details of the analysis of arsenic trichloride noted earlier (*Nature*, 1929, **123**, 944). Recrystallised arsenic trioxide was reduced with sugar charcoal, and the metal resublimed. Conversion of the metal into chloride was followed by repeated vacuum distillation of the latter. Samples were collected for weighing in sealed evacuated bulbs. Hydrolysis with ice water was followed by comparison with silver in the usual way. In two cases the silver chloride was collected and weighed. Vacuum weights are given.

The Atomic Weight of Arsenic.

Wt. of $AsCl_3$.	Wt. of Ag.	Ratio, $AsCl_3$: 3Ag.	At. wt. of arsenic.*	Wt. of AgCl.	Ratio, $AsCl_3$: 3AgCl.	At. wt. of arsenic.*
3·98710	7·11681	0·560237	74·944			
4·81766	8·59961	0·560218	74·938			
6·27437	11·20020	0·560201	74·933			
2·42721	4·33242	0·560244	74·946	5·75672	0·421631	74·934
3·86442	6·89796	0·560227	74·941			
5·09819	9·10041	0·560215	74·937			
5·46890	9·76222	0·560211	74·936			
5·10039	9·10415	0·560227	74·941			
5·71146	10·19540	0·560200	74·932			
3·05992	5·46180	0·560240	74·945			
1·49994	2·67755	0·560191	74·929	3·55734	0·421646	74·941
	Average	0·560219	74·938		0·421638	74·938

* Calculated with Cl = 35·457. The figures given by the author are calculated with Cl = 35·458.

This value is slightly lower than the value which has been in use for some time, and slightly higher than that found by Aston with the mass spectrograph after correction for the presence of O^{18}, *viz.*, 74·927. The value 74·93 is adopted in the table of atomic weights.

Tantalum.—Krishnaswami (J., 1930, 1277) has analysed the chloride and bromide of tantalum. Metallic tantalum was first obtained by reducing purified potassium tantalum fluoride with sodium in an atmosphere of argon. When examined spectroscopically the metal appeared to be free from impurities, although it contained a small percentage of oxide. The metal was converted to halides by the action of pure dry halogens, and the halides were twice distilled in vacuum and collected in sealed glass bulbs. After being weighed, the bulbs were broken under ammonia, and the solutions filtered to remove glass and tantalic acid. To find the weight of the glass, the tantalic acid was dissolved in oxalic acid and the glass was collected on a weighed crucible. The solutions were then compared with silver and the silver halides were collected and weighed. Weights are corrected to vacuum.

The Atomic Weight of Tantalum.

Wt. of $TaBr_5$.	Wt. of Ag.	Ratio, $TaBr_5$: 5Ag.	At. wt. of tantalum.	Wt. of AgBr.	Ratio, $TaBr_5$: 5AgBr.	At. wt. of tantalum.
3·07127				4·96415	0·61869	181·36
3·72095				6·01413	0·61870	181·37
3·81890	3·54594	1·07698	181·34	6·17267	0·61868	181·35
3·59654	3·33939	1·07700	181·36	5·81303	0·61870	181·37
2·69071	2·49831	1·07701	181·37	4·34926	0·61866	181·33
2·61163	2·42488	1·07702	181·37	4·22133	0·61868	181·35
3·92094	3·64064	1·07699	181·35	6·33750	0·61869	181·36
2·04583	1·89956	1·07700	181·36	3·30681	0·61867	181·34
	Average	1·07700	181·36		0·61868	181·35

Wt. of $TaCl_5$.	Wt. of Ag.	Ratio, $TaCl_5$: 5Ag.	At. wt. of tantalum.	Wt. of AgCl.	Ratio, $TaCl_5$: 5AgCl.	At. wt. of tantalum.
3·15350	4·74301	0·66488	181·35	6·30152	0·50044	181·37
2·96215	4·45549	0·66483	181·33	5·91874	0·50047	181·40
4·08061	6·13756	0·66486	181·34	8·15438	0·50042	181·36
3·21073	4·82972	0·66479	181·30	6·41613	0·50042	181·36
3·49922	5·26278	0·66490	181·36	6·99201	0·50046	181·39
	Average	0·66485	181·34		0·50044	181·37

The average value, 181·36, is lower than that found by Balke in 1910, *viz.*, 181·50. Balke's method, in which the ratio $TaCl_2 : Ta_2O_2$ was determined, has been found to be untrustworthy because of the uncertain composition of most oxides. The new value therefore has been adopted.

Rhenium.—Hönigschmid and Sachtleben (*Z. anorg. Chem.*, 1930, **191**, 309) have taken advantage of the increased quantities of rhenium now available by analysing silver per-rhenate. Three specimens of material were prepared. (I) Potassium per-rhenate was recrystallised and the silver salt precipitated; retained potassium was removed by reprecipitation and crystallisation. (II) Metallic rhenium was burned to heptoxide in oxygen, and after solution of the oxide in water silver per-rhenate was precipitated with silver nitrate. (III) The third sample was prepared by dissolving silver oxide in per-rhenic acid.

The silver salt was prepared for weighing by fusion in air of a mixture of the per-rhenate with an excess of acid. Weighed amounts of salt were dissolved in water and the silver was precipitated as silver bromide. Weights are corrected to vacuum.

The Atomic Weight of Rhenium.

Sample.	Wt. of $AgReO_4$.	Wt. of AgBr.	Ratio, $AgReO_4$: AgBr.	At. wt. of rhenium.
I	5·36365	2·81186	1·90751	186·34
II	7·83577	4·10795	1·90747	186·33
II	8·55829	4·48684	1·90742	186·33
II	6·34973	3·32894	1·90743	186·33
III	8·90918	4·67111	1·90729	186·30
III	6·95494	3·64684	1·90712	186·27
III	7·85704	4·11955	1·90726	186·30
		Average	1·90735	186·31

This result is 2·4 units lower than the preliminary value found by W. and I. Noddack by analysis of the disulphide, but in view of the inferiority of the latter method and the small quantities weighed, the new value 186·31 is adopted for the table.

Thallium.—Hönigschmid and Stribel (*Z. anorg. Chem.*, 1930, **194**, 293) prepared thallous bromide by precipitation from a solution of the purified sulphate. After distillation in nitrogen the salt was weighed in a quartz tube. Solution in hot water was followed by hot precipitation with a nearly equivalent amount of silver. The end point was found with a nephelometer in the usual way. Weights are corrected to vacuum.

The Atomic Weight of Thallium.

Wt. of TlBr.	Wt. of Ag.	Ratio, TlBr : Ag.	At. wt. of thallium.
		Preliminary series.	
3·86281	1·46582	2·63526	204·38
3·78429	1·43583	2·63561	204·41
3·96949	1·50639	2·63510	204·36
3·94471	1·49669	2·63562	204·42
	Average	2·63540	204·39
		Final series.	
4·01222	1·52251	2·63527	204·377
3·97142	1·50692	2·63546	204·397
3·90498	1·48170	2·63547	204·399
4·07193	1·54509	2·63540	204·391
3·68886	1·39974	2·63539	204·390
4·04739	1·53580	2·63536	204·387
	Average	2·63539	204·390

This value agrees exactly with that found earlier by Hönigschmid, Berkenbach, and Kothe through the analysis of thallous chloride.

Lead.—Baxter and Bliss (*J. Amer. Chem. Soc.*, 1930, **52**, 4848) have determined the atomic weight of two specimens of Ra-*G*. The first was extracted from Swedish kolm, and the second from uraninite from Wilberforce, Ontario, Canada. Purification was effected by crystallisation as chromate, sulphate, nitrate, and chloride. After resublimation, the chloride was fused preparatory to weighing. Comparison with silver was carried out as usual. Weights are corrected to vacuum.

The Atomic Weight of Lead.

Sample.	Wt. of Pb.	Wt. of Ag.	Ratio, $PbCl_2$: 2Ag.	At. wt. of lead.
Common	2·74332	2·12809	1·28910	207·222
	3·60741	2·79852	1·28904	207·209
	3·07537	2·38565	1·28911	207·224
	2·81471	2·18351	1·28908	207·218
			1·28909	207·218
Kolm	1·61294	1·25678	1·28339	205·990
	1·60407	1·24983	1·28343	205·999
	2·56499	1·99842	1·28351	206·016
	1·83748	1·43167	1·28345	206·003
	3·32075	2·58729	1·28349	206·011
	3·07451	2·39530	1·28356	206·027
			1·28347	206·008
Uraninite	3·74779	2·91608	1·28433	206·194
	5·63102	4·38436	1·28434	206·196
			1·28434	206·195

The kolm lead has a lower atomic weight than any other specimen yet examined and seems to consist almost entirely of the isotope Pb^{206}.

Aston (*Proc. Roy. Soc.*, 1930, *A*, **126**, 511; 1931, *A*, **130**, 302; *Nature*, 1930, **126**, 200, 348) has extended the usefulness of the mass spectrograph to the determination of the chemical atomic weight of complex elements by micro-photometric measurements of the intensities of the isotopic lines in a mass spectrogram. The following table gives the percentages of the components, as well as the packing fractions and the atomic weight calculated on the basis of chemical oxygen.

Isotopic Weights and Percentages.

							Packing fraction $\times 10^4$.	At. wt. (O = 16·000).
Chromium	50	52	53	54			−10	52·011
	4·9	81·6	10·4	3·1				
Zinc	64	65	66	67			− 9·9	65·380
	48·0	2·5	25·9	5·3				
	68	69	70					
	17·1	0·85	0·38					
Molybdenum	92	94	95	96			− 5·5	95·97
	14·2	10·0	15·5	17·8				
	97	98	100					
	9·6	23·0	9·8					
Krypton	78	80	82	83	84	86	− 8·8	83·77
	0·42	2·45	11·79	11·79	56·86	16·70		
Tin	112	114	115	116	117	118	− 7·3	118·72
	1·07	0·74	0·44	14·19	9·81	21·48		
	119	120	121	122	124			
	11·02	27·04	2·96	5·03	6·19			
Xenon	124	126	128	129	130		− 5·3	131·27
	0·08	0·08	27·30	2·13	4·18			
	131	132	134	136				
	20·67	26·45	10·31	8·79				
Mercury	196	198	199	200			+ 0·8	200·62
	0·10	9·89	16·45	23·77				
	201	202	204					
	13·67	25·27	6·85					

The close agreement of the calculated atomic weights with those found by chemical means in the case of chromium, zinc, molybdenum, tin, and mercury indicates that the method is capable of giving results of a high degree of accuracy. In the case of krypton and xenon, the calculated and the experimental (density) values are discrepant, and, as pointed out by Aston, new determinations of the densities and compressibilities of these gases should be made.

ATOMIC WEIGHTS

1931

	Symbol.	At. No.	At. wt.		Symbol.	At. No.	At. wt.
Aluminium	Al	13	26·97	Neon	Ne	10	20·183
Antimony	Sb	51	121·76	Nickel	Ni	28	58·69
Argon	A	18	39·944	Niobium	Nb		
Arsenic	As	33	74·93	(Columbium)	(Cb)	41	93·3
Barium	Ba	56	137·36	Niton	Nt		
Beryllium	Be	4	9·02	(Emanation)	(Em)	86	222
Bismuth	Bi	83	209·00	Nitrogen	N	7	14·008
Boron	B	5	10·82	Osmium	Os	76	190·8
Bromine	Br	35	79·916	Oxygen	O	8	16·0000
Cadmium	Cd	48	112·41	Palladium	Pd	46	106·7
Cæsium	Cs	55	132·81	Phosphorus	P	15	31·02
Calcium	Ca	20	40·07	Platinum	Pt	78	195·23
Carbon	C	6	12·00	Potassium	K	19	39·10
Cerium	Ce	58	140·13	Praseodymium	Pr	59	140·92
Chlorine	Cl	17	35·457	Radium	Ra	88	225·97
Chromium	Cr	24	52·01	Rhenium	Re	75	186·31
Cobalt	Co	27	58·94	Rhodium	Rh	45	102·91
Copper	Cu	29	63·57	Rubidium	Rb	37	85·44
Dysprosium	Dy	66	162·46	Ruthenium	Ru	44	101·7
Erbium	Er	68	167·64	Samarium	Sm	62	150·34
Europium	Eu	63	152·0	Scandium	Sc	21	45·10
Fluorine	F	9	19·00	Selenium	Se	34	79·2
Gadolinium	Gd	64	157·3	Silicon	Si	14	28·06
Gallium	Ga	31	69·72	Silver	Ag	47	107·880
Germanium	Ge	32	72·60	Sodium	Na	11	22·997
Gold	Au	79	197·2	Strontium	Sr	38	87·63
Hafnium	Hf	72	178·6	Sulphur	S	16	32·06
Helium	He	2	4·002	Tantalum	Ta	73	181·4
Holmium	Ho	67	163·5	Tellurium	Te	52	127·5
Hydrogen	H	1	1·0078	Terbium	Tb	65	159·2
Indium	In	49	114·8	Thallium	Tl	81	204·39
Iodine	I	53	126·932	Thorium	Th	90	232·12
Iridium	Ir	77	193·1	Thulium	Tm	69	169·4
Iron	Fe	26	55·84	Tin	Sn	50	118·70
Krypton	Kr	36	82·9	Titanium	Ti	22	47·90
Lanthanum	La	57	138·90	Tungsten	W	74	184·0
Lead	Pb	82	207·22	Uranium	U	92	238·14
Lithium	Li	3	6·940	Vanadium	V	23	50·95
Lutecium	Lu	71	175·0	Xenon	Xe	54	130·2
Magnesium	Mg	12	24·32	Ytterbium	Yb	70	173·5
Manganese	Mn	25	54·93	Yttrium	Y	39	88·92
Mercury	Hg	80	200·61	Zinc	Zn	30	65·38
Molybdenum	Mo	42	96·0	Zirconium	Zr	40	91·22
Neodymium	Nd	60	144·27				