Thallium.—Tl = 204.39. HÖNIGSCHMID, BIRCKENBACH and KOTHE [*Sitzber. Bayer. Akad. Wiss.*, **1922**, 179] find from the ratio TlCl : Ag, Tl = 204.39; and from the ratio TlCl : AgCl, Tl = 204.39.

Thulium.—Tm = 169.4. JAMES and STEWART [THIS JOURNAL, **42**, 2022 (1920)] find Tm = 169.39.

Titanium.—BAXTER and FERTIG [*ibid.*, **45**, 1228 (1923)] find by analysis of the tetrachloride, Ti = 47.85. Since this result is preliminary no change is recommended.

Yttrium.—Y = 88.9. Mean of the best determinations.

Zinc.—Zn = 65.38. RICHARDS and ROGERS find Zn = 65.376 [*Proc. Am. Acad.*, **31**, 158 (1895)]. BAXTER and GROSE find Zn = 65.389 [THIS JOURNAL, **38**, 868 (1916)]. BAXTER and HODGES find Zn = 65.381 [*ibid.*, **43**, 1242 (1921)].

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THIRTY-FIRST ANNUAL REPORT OF THE COMMITTEE ON ATOMIC WEIGHTS. DETERMINATIONS PUBLISHED DURING 1924

BY GREGORY PAUL BAXTER

RECEIVED FEBRUARY 10, 1925 PUBLISHED MARCH 5, 1925

A Report of the German Committee on Atomic Weights has been published.[1]

Carbon.—Batuecas[2] has determined the weight of the normal liter of methyl oxide.

	Globe I, 773.4 cc.			Globe II, 220.3 cc.	
Globe I	2.1100	2.1105	2.1105	2.1104	2.1098
Globe II	2.1097	2.1105	2.1107	2.1084	2.1102
Av.	2.1099	2.1105	2.1106	2.1094	2.1100
Globe I	2.1099	2.1085	2.1093	2.1101	2.1086
Globe II	2.1091	2.1090	2.1098	2.1094	2.1084
Av.	2.1095	2.1087	2.1096	2.1097	2.1085
				Av.	2.1097

Experimental values of the compressibility and deviation from Boyle's Law extrapolated from data at 1 and 2/3 atmospheres gave $(PV)_0/(PV)_1$ as 1.0270 and C = 11.999.

regarding this atomic weight, and also for more recent information regarding the other atomic weights, see the following article entitled "Report of the Committee on Atomic Weights," by G. P. Baxter.—A. B. L.

[1] *Ber.*, **57**B, I (1924).

[2] Batuecas, *Compt. rend.*, **179**, 440, 565 (1924); *Anal. soc. españ. fís. quím.*, **22**, 409 (1924).

Nitrogen.—Moles and Clavera[3] have determined the density of nitrogen formed by decomposition of sodium nitride. In the following table are given the values for the weight of one liter at 0° and 760 mm. at sea level, Lat. 45°.

Density of nitrogen	1.25004	1.25061	1.25100	1.25052	1.25010	1.25027
					Av.	1.25042

With the density 1.42892 for oxygen, and the values for $(PV)_0/(PV)_1$ for oxygen and nitrogen, respectively, 1.00085 and 1.00044, the atomic weight of nitrogen is 14.007.

Oxygen.—Baxter and Starkweather[4] have determined the density of oxygen, using globes of about one liter capacity. Refinements of measurement were progressively greater in the order of the series. The weight of the liter is referred to sea level at Lat. 45°.

Density of Oxygen

Source of oxygen		Globe I	Globe II	Globe III	Av.
		Series 1			
Electrolytic		(1.42726)	1.42899	1.42869	1.42884
Electrolytic		1.42949	1.42803	1.42820	1.42857
Electrolytic		1.42883	1.42939	1.42910	1.42911
		1.42847	1.42883	1.42866	1.42865
	Av.	1.42893	1.42881	1.42866	1.42879
		Series 2			
Electrolytic		1.42939	1.42938	1.42933	1.42937
Electrolytic		1.42926	1.42904	1.42918	1.42916
	Av.	1.42933	1.42921	1.42926	1.42926
		Series 3			
Electrolytic		1.42887	1.42892	1.42889	1.42889
Electrolytic		1.42926	1.42906	1.42926	1.42919
Electrolytic		1.42942	1.42924	1.42944	1.42937
	Av.	1.42918	1.42907	1.42920	1.42915
		Series 4			
Electrolytic, distilled		1.42899	1.42887	1.42870	1.42885
Electrolytic, distilled		1.42917	1.42915	1.42929	1.42920
Electrolytic, distilled		1.42895	1.42898	1.42909	1.42901
	Av.	1.42904	1.42900	1.42903	1.42902
		Series 5			
Electrolytic, distilled		1.42897	1.42893	1.42924	1.42905
$KMnO_4$, distilled		1.42890	1.42907	1.42906	1.42901
$KMnO_4$, distilled		1.42906	1.42902	1.42918	1.42909
$KMnO_4$, distilled		1.42881	1.42884	1.42897	1.42887
$KMnO_4$, distilled		1.42892	1.42895	1.42903	1.42897
	Av.	1.42893	1.42896	1.42911	1.42900

[3] Moles and Clavera, *J. chim. phys.*, **21**, 10 (1924).

[4] Baxter and Starkweather, *Proc. Nat. Acad. Sci.*, **10**, 479 (1924).

DENSITY OF OXYGEN (*Concluded*)

Source of oxygen	Globe I	Globe II	Globe III	Av.
	SERIES 6			
$KClO_3$, distilled	1.42895	1.42901	1.42893	1.42896
$KClO_3$, distilled	1.42900	1.42900	1.42905	1.42902
$KClO_3$, distilled	1.42899	1.42894	1.42905	1.42899
$KMnO_4$, distilled	1.42897	1.42903	1.42900	1.42900
Electrolytic, distilled	1.42906	1.42903	1.42906	1.42905
Av.	1.42899	1.42900	1.42902	1.42900
Gen. av.	1.42903	1.42899	1.42902	1.42901
Av. of series 4, 5, 6	1.42898	1.42899	1.42905	1.42901

Aluminum.—Krepelka[5] synthesized aluminum chloride from pure aluminum and dry chlorine. The product was resublimed in an exhausted glass apparatus until free from iron, and was collected in sealed glass bulbs. Comparison with silver followed weighing and solution in water. Weights are in vacuum. Cl = 35.458.

ATOMIC WEIGHT OF ALUMINUM

Wt. of $AlCl_3$	Wt. of Ag	Ratio	At. wt. of Al
1.71036	4.15127	0.412009	26.969
2.59733	6.30438	.411998	26.962
1.98148	4.80897	.412038	26.978
2.73108	6.62852	.412019	26.972
3.18750	7.73663	.412001	26.966
1.37059	3.32652	.412019	26.972
2.99900	7.27846	.412038	26.978
3.77259	9.15600	.412035	26.977
2.88939	7.01296	.412007	26.968
2.22557	5.40157	.412023	26.973
1.88892	4.58440	.412032	26.976
	Av.	.412019	26.972

The result is in good agreement with that recently found by Richards and Krepelka, 26.963.

Silicon.—Hönigschmid and Steinheil[6] analyzed silicon tetrachloride which had been purified by fractional distillation in a vacuum by Stock. The tetrachloride was decomposed with pure sodium hydroxide and the solution compared with silver. Weights are in vacuum. Cl = 35.457.

ATOMIC WEIGHT OF SILICON

Wt. of $SiCl_4$	Wt. of Ag	Ratio	At. wt. of Si
1.49033	3.78443	0.393806	28.107
1.58040	4.01314	.393806	28.107
1.59309	4.04534	.393809	28.108
1.14539	2.90866	.393786	28.099
	Av.	.393802	28.105

[5] Krepelka, THIS JOURNAL, **46,** 1343 (1924).

[6] Hönigschmid and Steinheil, *Z. anorg. allgem. Chem.*, **141,** 101 (1924).

The result is slightly higher than the value found by Baxter, Weatherill and Scripture, 28.06.

Chlorine.—Zintl and Meuwsen[7] converted sodium nitrate to chloride by heating weighed amounts of fused powdered nitrate in a current of hydrogen chloride to a temperature below the fusing point of the chloride. Weights are in vacuum.

Wt. of $NaNO_3$	3.37222	2.87638	2.96933	3.15073	3.12297
Wt. of NaCl	2.31984	1.97796	2.04188	2.16664	2.14753
Ratio	1.45421	1.45422	1.45421	1.45420	1.45421
Wt. of $NaNO_3$	3.23126	3.20699	2.82496	3.27862	3.36113
Wt. of NaCl	2.22192	2.20526	1.94258	2.25452	2.31136
Ratio	1.45426	1.45425	1.45423	1.45424	1.45418
				Av. ratio	1.45422

Assuming N = 14.008, AgCl/Ag = 1.328668 and NaCl/Ag = 0.541854, the following values are calculated: Ag = 107.880, Na = 22.9985, Cl = 35.457.

Lorenz and Bergheimer[8] synthesized silver chloride from silver obtained from the Deutsche Gold und Silberscheideanstalt, but not subjected to further purification. Weights are corrected to a vacuum.

Wt. of Ag	Wt. of AgCl	Ratio	Wt. of Ag	Wt. of AgCl	Ratio
2.82194	3.74890	0.752739	6.76790	8.99196	0.752661
3.30652	4.39225	.752818	7.46311	9.91585	.752645
0.87721	1.16545	.752679	7.21049	9.58002	.752659
2.92760	3.88975	.752645	5.93154	7.88119	.752620
1.007774	1.338161	.753103	6.37384	8.46843	.752659
1.105106	1.467804	.752898	5.70374	7.57781	.752690
1.052596	1.397773	.753052	6.99230	9.29004	.752666
1.041902	1.383446	.753121	7.41671	9.85438	.752631
1.177455	1.563656	.752062	5.72608	7.60788	.752651
1.000489	1.328767	.752946	8.01869	10.65352	.752680
1.050800	1.394594	.753481			Av. .752780
10.31151	13.69274	.753064			

The final ratio corresponds to the atomic weight, 35.429, for chlorine.

Mlle. Gleditsch[9] has compared chlorine contained in ammonium chloride of volcanic origin (Vesuvius) and that contained in mine water from great depths (Lake Superior, U. S. A., Calumet and Hecla mines) with ordinary chlorine by determining the ratio of silver to silver chloride. No difference could be detected.

[7] Zintl and Meuwsen, *Z. anorg. allgem. Chem.*, **136,** 223 (1924).

[8] Lorenz and Bergheimer, *ibid.*, **138,** 205 (1924).

[9] Mlle. Gleditsch, *J. chim. phys.*, **21,** 456 (1924).

Atomic Weight of Chlorine

Source of chlorine	Wt. of Ag	Wt. of AgCl	At. wt. of Cl
Vesuvius	0.7175	0.9531	35.43
	.6932	0.9212	35.48
	.8469	1.1254	35.47
	.9323	1.2387	35.45
Calumet and Hecla Mine	.8080	1.0736	35.46
	.8908	1.1836	35.46
	.8699	1.1558	35.46
	.8579	1.1398	35.45
$BaCl_2$	.4710	0.6259	35.48
	.7557	1.0041	35.46

Cobalt.—Baxter and Dorcas[9a] have compared terrestrial and meteoric cobalt by analysis of the chloride. After careful purification the chloride was slowly dehydrated in a stream of dry hydrogen chloride in a quartz tube and was sublimed to eliminate silica. The sublimed material was fused in dry hydrogen chloride before being weighed. Solution and comparison with silver followed. Weights are corrected to a vacuum. Cl = 35.458.

Atomic Weight of Cobalt

Sample of $CoCl_2$	Wt. of $CoCl_2$	Wt. of Ag	Ratio	At. wt. of Co
Terrestrial	5.37099	8.92353	0.601891	58.948
	5.54240	9.20959	.601807	58.930
	6.85503	11.39037	.601827	58.934
	4.25562	7.07114	.601829	58.935
	7.76501	12.90054	.601914	58.953
	6.51902	10.83167	.601848	58.939
	9.64093	16.01834	.601868	58.943
		Av.	.601855	58.940
Meteoric	8.02742	13.33750	.601868	58.943
	6.02652	10.01289	.601876	58.945
	8.28996	13.77431	.601842	58.937
		Av.	.601862	58.942
		Av. of all	.601857	58.941

This value is slightly lower than the current one, 58.97.

Copper.—Ruer and Bode[10] prepared copper oxide by precipitation of the nitrate with potassium carbonate and ignition, finally at 700° in oxygen to constant weight (I). Oxide was also made by ignition of the nitrate (II). Reduction in hydrogen followed. Weights are corrected to a vacuum.

[9a] Baxter and Dorcas, This Journal, **46**, 357 (1924).

[10] Ruer and Bode, *Z. anorg. allgem. Chem.*, **137**, 101 (1924).

ATOMIC WEIGHT OF COPPER

Sample	Wt. of CuO	Wt. of Cu	Ratio	At. wt. of Cu
I	4.84480	3.86981	1.25195	63.506
II	3.28113	2.62113	1.25180	63.543
II	4.67558	3.73506	1.25181	63.540
II	2.57201	2.05458	1.25184	63.532
II	4.40776	3.52126	1.25176	63.553
I	3.07802	2.45887	1.25180	63.542
II	4.92491	3.93438	1.25176	63.552
II	6.17514	4.93316	1.25176	63.552
		Av.	1.25181	63.540

Germanium.—Baxter and Cooper[11] synthesized germanium tetrachloride from germanium extracted from zinc oxide residues. The tetrachloride was purified by fractional distillation in exhausted vessels and was collected for weighing in sealed glass bulbs. Decomposition with sodium hydroxide and comparison with silver followed. Weights are corrected to a vacuum. Cl = 35.458. The fractions are numbered in the order of decreasing volatility.

ATOMIC WEIGHT OF GERMANIUM

Fraction of $GeCl_4$	Wt. of $GeCl_4$	Wt. of Ag	Ratio	At. wt. of Ge	Wt. of AgCl	Ratio	At. wt. of Ge
6	4.32030	8.68794	(0.497276)	(72.753)			
31	4.86658	9.79368	.496910	72.595			
7	5.16272	10.38523	(.497121)	(72.686)			
30	3.85268	7.75291	.496933	72.605			
8	4.67090	9.40026	.496891	72.586			
28	4.27610	8.60470	.496949	72.611			
9	5.96671	12.00757	.496912	72.595			
10	4.53734	9.13083	.496925	72.601			
27	3.11571	6.26980	.496939	72.607			
11	3.97498	7.99922	.496921	72.599			
26	5.07110	10.20475	.496935	72.605			
12	4.91397	9.88831	.496947	72.611	13.13693	(0.374058)	(72.635)
25	6.05244	12.17963	.496931	72.604	16.18202	(.374024)	(72.615)
24	5.21384	10.49232	.496920	72.599	13.94060	.374004	72.604
14	5.20164	10.46730	.496942	72.608	13.90710	.374028	72.618
15	5.34510	8.74401	.496923	72.600	11.61826	.373989	72.595
22	4.18788	8.42760	.496924	72.601	11.19773	.373994	72.598
16	4.24281	8.53785	.496941	72.608	11.34331	.374036	72.622
		Av.	.496928	72.602		.374010	72.607

Müller has recently found 72.42.

Yttrium.—Hönigschmid and Meuwsen[12] prepared yttrium chloride from yttrium material provided by Auer von Welsbach and by Prandtl. The chloride was carefully dehydrated and finally fused. Analysis by comparison with silver and silver chloride followed. Weights are in vacuum. Cl = 35.457.

[11] Baxter and Cooper, *Proc. Am. Acad. Arts Sci.*, **59**, 235 (1924); *J. Phys. Chem.*, **27**, 1049 (1924).

[12] Hönigschmid and Meuwsen, *Z. anorg. allgem. Chem.*, **140**, 341 (1924).

Atomic Weight of Yttrium

Wt. of YCl_3	Wt. of AgCl	Ratio	At. wt. of Y	Wt. of AgCl	Ratio	At. wt. of Y
			Prandtl I			
2.57083	5.65560	0.454564	89.095	4.54086	0.603941	89.088
2.58173	5.67954	.454567	89.098			
2.74241	6.03323	.454551	89.095			
	Av.	.454561	89.096			
			Auer von Welsbach			
2.72339				5.99220	.454489	89.064
2.98741	4.94746	.603827	89.052	6.57340	.454470	89.056
3.70222	6.13106	.603847	89.058	8.14633	.454465	89.054
4.02400	6.66401	.603841	89.056	8.85460	.454453	89.049
2.28303	3.78075	.603856	89.061	5.02335	.454484	89.062
	Av.	.603843	89.057		.454472	89.057
			Prandtl II			
2.57930				5.67874	.454203	88.941
2.98800	4.95092	.603524	88.954	6.57793	.454246	88.960
2.80296	4.64434	.603510	88.949	6.17068	.454238	88.957
3.10590	5.14642	.603507	88.948	6.83800	.454212	88.945
	Av.	.603514	88.950		.454225	88.951

Since the first two preparations contained small amounts of other rare earths, but the third was very nearly pure, the result of the analysis of the third, 88.95, is considered most trustworthy. This value agrees better with that found by Fogg and James, 89.05, than with any other.

Zirconium.—Venable and Bell[13] correct earlier results obtained by analysis of the chloride, on the basis of a determination of the hafnium content of the zirconium material made by Hevesy. The corrected results are 91.68 for the zirconium determinations and 91.32 for the chlorine determinations. The latter method is more reliable.

Hevesy and Jantzen[13a] have determined the hafnium content of certain zirconium material used in the past for atomic weight determinations.

Hönigschmid, Zintl and Gonzalez[14] purified zirconium material from hafnium by crystallization of the potassium double fluoride and the oxychloride. A second sample already purified by Hevesy in the former way was further crystallized as oxychloride. The first preparation in the form of oxide contained approximately 0.5% of hafnium oxide, the second 0.05%. To prepare zirconium tetrabromide, the oxide was mixed with charcoal and heated in a current of nitrogen and bromine. The product was then sublimed in a vacuum and collected in sealed glass bulbs. Comparison with silver followed. Weights are corrected to a vacuum. Br = 79.916.

[13] Venable and Bell, This Journal, **46**, 1833, 2881 (1924).

[13a] Hevesy and Jantzen, *Naturwissenschaften*, **12**, 729 (1924).

[14] Hönigschmid, Zintl and Gonzalez, *Z. anorg. allgem. Chem.*, **139**, 293 (1924); *Anal. Soc. españ. fís. quím.*, **22**, 432 (1924).

Atomic Weight of Zirconium

Wt. of $ZrBr_4$	Wt. of Ag	Ratio	At. wt. of Zr	Wt. of AgBr	Ratio	At. wt. of Zr
			Sample I			
3.00017				5.48034	0.547442	91.57
1.98761	2.08567	0.95298	91.57			
1.01898	1.06932	.95292	91.54			
2.07289	2.17512	.95300	91.57			
	Av.	.95297	91.56			
			Sample II			
0.92989				1.69974	.547078	91.29
1.98731				3.63278	.547049	91.27
			Final Series			
6.53943	6.86736	.952248	91.25	11.95444	.547029	91.26
2.12315	2.22965	.952235	91.24	3.88129	.547022	91.25
5.47989	5.75471	.952244	91.25	10.01763	.547025	91.25
2.20216	2.31263	.952232	91.24	4.02582	.547009	91.24
3.09729	3.25256	.952262	91.26	5.66210	.547021	91.25
	Av.	.952244	91.25		.527021	91.25

If the results are corrected for hafnium content, that from Sample I becomes 91.30, and that from Sample **II**, 91.22.

Antimony.—Hönigschmid, Zintl and Linhard[15] synthesized antimony trichloride and tribromide by heating the pure metal in chlorine and in nitrogen charged with bromine. The products were distilled over antimony in nitrogen and finally in a vacuum and were collected in sealed glass bulbs. Comparison with silver in the presence of tartaric acid followed. Weights are corrected to a vacuum. Cl = 35.457; Br = 79.916.

Atomic Weight of Antimony

Wt. of $SbCl_3$	Wt. of Ag	Ratio	At. wt. of Sb	Wt. of AgCl	Ratio	At. wt. of Sb
3.77931	5.36164	0.70488	121.76	6.12381	0.53052	121.76
3.02584	4.29267	.70489	121.76	5.70309	.53056	121.78
3.51615	4.98791	.70494	121.78	6.62766	.53053	121.76
3.70530	5.25661	.70488	121.76	6.98388	.53055	121.77
3.43533	4.87367	.70488	121.76	6.47484	.53057	121.78
4.51074	6.39951	.70486	121.75	8.50262	.53051	121.75
3.60652	5.11671	.70485	121.75	6.79833	.53050	121.75
4.04921	5.74462	.70487	121.75	7.63249	.53052	121.76
	Av.	.70488	121.76		.53053	121.76
Wt. of $SbBr_3$	Wt. of Ag	Ratio	At. wt. of Sb	Wt. of AgBr	Ratio	At. wt. of Sb
2.76166	2.74238	1.11700	121.76	4.30370	0.64169	121.77
3.72476	3.33482	1.11693	121.74	5.80516	.64163	121.74
6.34549	5.68097	1.11697	121.75	9.88958	.64163	121.74
4.00283	3.58351	1.11701	121.76	6.23818	.64167	121.76
4.67768	4.18771	1.11700	121.76	7.28981	.64167	121.76
4.00923	3.58937	1.11697	121.75	6.24828	.64165	121.75
4.17334	3.73624	1.11699	121.76	6.50411	.64165	121.75
3.97909	3.56216	1.11704	121.77	6.20056	.64173	121.80
	Av.	1.11699	121.76		.64167	121.76

[15] Hönigschmid, Zintl and Linhard, *Z. anorg. allgem. Chem.*, **136**, 257 (1924).

Weatherill[16] also has prepared and analyzed the trichloride, in a similar way. Vacuum weights are given. Cl = 35.458.

Atomic Weight of Antimony

Wt. of $SbCl_3$	Wt. of Ag	Ratio	At. wt. of Sb
2.22658	3.15913	(0.704808)	(121.730)
2.17394	3.08412	.704882	121.754
2.97080	3.21478	.704853	121.745
2.27024	3.22083	.704862	121.747
3.55903	5.04936	.704848	121.743
2.52017	3.57531	.704881	121.754
1.98530	2.81661	.704854	121.745
2.75200	3.90429	.704865	121.749
2.57051	3.64682	.704863	121.748
3.15055	4.46971	.704867	121.749
	Av.	.704864	121.748

Both researches confirm the value recently obtained by Willard and MacAlpine, 121.7.

Hafnium.—Hönigschmid and Zintl,[17] using hafnium oxide containing approximately 6% of zirconium oxide, prepared and analyzed the tetrabromide. Weights are corrected to a vacuum. Br = 79.916.

Atomic Weight of Hafnium

Wt. of $HfBr_4$	Wt. of Ag	Ratio	At. wt. of Hafnium
1.91712	2.92983	0.65435	171.87
0.92661	1.41600	.65439	171.90
	Av.	.65437	171.88

The result corrected for zirconium content is 180.8.

Atomic Weight of Bismuth

Wt. of $Bi(C_6H_5)_3$	Wt. of Bi_2O_3	Ratio	At. wt. of Bi
3.13342	1.65870	1.88907	208.977
2.8745	1.52164	1.88908	208.975
4.32153	2.28772	1.88901	208.993
2.33152	1.23423	1.88904	208.986
2.94437	1.55862	1.88908	208.969
3.13342	1.65870	1.88907	208.977
4.99995	2.64665	1.88895	209.009
2.66530	1.41089	1.89902	208.990
5.34160	2.82761	1.88903	208.988
4.71205	2.49443	1.88903	208.988
3.95465	2.09357	1.88894	209.012
4.35763	2.30687	1.88897	209.003
4.67110	2.47272	1.88905	208.982
3.83433	2.02977	1.8890	208.997
3.98876	2.11154	1.88902	208.991
		Av.	208.989

16 Weatherill, This Journal, **46**, 2437 (1924).

17 Hönigschmid and Zintl, *Z. anorg. allgem. Chem.*, **140**, 335 (1924).

Bismuth.—Classen and Strauch[18] converted weighed quantities of redistilled bismuth triphenyl into bismuth oxide by treatment with an excess of oxalic acid and gradual heating to 750°. Weights are corrected to a vacuum. C = 12.001. H = 1.0077.

Aston[19] has obtained evidence concerning the isotopic character of several elements not previously analyzed.

ISOTOPIC CHARACTER OF ELEMENTS

Element	Atomic number	Atomic weight	Minimum number of isotopes	Mass number in order of intensity
Fe	26	55.84	2	56,54
Sr	38	87.63	2	88,86
Zr	40	91.2	4	90,94,92,96?
Cd	48	112.41	6	114,112,110,113,111,116
In	49	114.8	1	115
Te	52	127.5	3	128,130,126
Ba	56	137.37	1	138
La	57	138.90	1	139
Ce	58	140.25	2	140,142
Pr	59	140.92	1	141
Nd	60	144.27	4	142,144,146,145
Er	68	167.7	?	164–176
Bi	83	209.00	1	209

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THE REDUCING ACTION OF HYDROGEN ADSORBED IN SILICA GEL

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It has long been known that certain charcoals reduce to the metallic state the ions of such metals as silver, gold and platinum. Early investigators concluded that carbon acted as the reducing agent but Green[1] decided that carbon monoxide and hydrogen in all probability caused the change. Others such as W. W. Taylor in his "Chemistry of Colloids" have said that the negatively charged surface of the charcoal neutralized the positive ion, causing the metal to precipitate.

Since silica gel resembles charcoal in so many ways as a porous substance the authors felt that it would be possible to determine definitely the reducing action of hydrogen adsorbed in porous bodies and incidentally

[18] Classen and Strauch, *Z. anorg. allgem. Chem.*, **141**, 82 (1924).

[19] Aston, *Nature*, **113**, 192, 856; **114**, 272, 717 (1924); also articles in *Phil. Mag.*

[1] Green, *Bull. Inst. Mining Met.*, **109** (1913).