inference is obvious. If Pb_{206} is simple, it should behave in like fashion and may have an atomic weight as low as 205.9.

It is indeed unreasonable to suppose that all the possible "packing" effect happens during the formation of the oxygen atom—a notion which is tacitly assumed if the sixteenth part of the atomic weight of oxygen is taken as the "whole number" unit. Indeed, if the packing effect is a reality, exact whole numbers would be out of the question in a majority of cases.

From the evidence now at hand the age of the uraninite from the Black Hills must be very great, and because of the nature of pegmatites, that of the strata in which it was found even greater. If there has been no concentration of lead, an age of about 1,500,000,000 years must be assigned as a minimum, using the present value of 4.66×10^{-18}/sec. of λ_{UI}. The greatest previous estimate of this kind (based on comparably accurate data) was for Canadian rocks, and was of the order of 1,200,000,000 years.[9]

We are indebted to the Carnegie Institution of Washington and to an anonymous benefactor of this Laboratory for generous financial support in this investigation.

Summary

A specimen of uranium lead from the Black Hills, South Dakota, was found to have an atomic weight of 206.07. Correction for known thorium content on the assumption of accepted inferences concerning thorium would reduce this value to 206.02. Since the lead in question is so nearly pure uranium lead, the high lead-uranium ratio, 0.23, indicates an age of at least 1,500,000,000 years. This extends yet further the earlier estimates of the age of the earth's crust.

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NOTES

The Use of Subscript and Superscript Exponents in Chemistry.[1]— Subscripts and superscripts are used in logic, in algebra and in higher mathematics in a manner consistent enough to permit the generalization that subscripts are used to *designate* the various members of a series or group of related symbols; while superscripts denote the same operation that would be represented by the *repetition* of the symbol to which the (superscript) exponent belongs, as many times as the exponent indicates. It would conduce to clearness of thought and ease of expression to preserve this distinction in the notations of arithmetic and of chemistry.

[9] Ellsworth, *Am. J. Sci.*, [5] **9**, 143 (1925).

[1] An abridgment of a paper presented before the Division of Physical and Inorganic Chemistry of the American Chemical Society at Washington, April, 1924.

In arithmetic these conventions would give on the one hand, $10^3 \equiv 1000$, $0.9^357 \equiv 0.99957$; and on the other hand,[2] for example, $c = 2_{10}9986$. In chemical symbols the suggested use of subscripts and superscript exponents would give $H^2O \equiv HHO$, and would make Li_6 and Li_7 represent two different atomic species of the element lithium, the subscripts being, in this case, the atomic weights of the two known isotopes of lithium. The first usage is that of French chemists, and of the German "Chemiker Kalendar," while the second has already been used to a considerable extent in spite of the obvious danger of confusion with the present subscript exponents.

As an example of the notation proposed, consider a molecule of phosphorus pentachloride containing three atoms of the chlorine isotope of atomic weight 35 and two of the isotope of atomic weight 37. Its formula would be $PCl^3_{35}Cl^2_{37}$. It is becoming increasingly apparent that formulas for such compounds must be written, and the sooner the convention is established the less confusion there will be.

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The Activity Coefficients of Several Types of Electrolytes Calculated from Freezing-Point Data.—The freezing-point data obtained by Hovorka[1] enable us to calculate the activity coefficients of several salts of different types in dilute solution. The calculation is made by a graphical integration of the equation:

$$d \, ln \, \gamma = \frac{d\theta}{1.8582\gamma m} - d \, ln \, m^{(2)}$$

The values at three molalities obtained are tabulated herewith.

ACTIVITY COEFFICIENTS

M	KCl	$CsNO_3$	K_2SO_4	$Ba(NO_3)_2$	$MgSO_4$	$CuSO_4$	$La_2(SO_4)_3$
0.001	0.966	0.966	0.889	0.889	0.765	0.762	0.477
.005	.928	.928	.781	.778	.572	.560	.232
.01	.902	.902	.715	.710	.471	.444	.150

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[2] For an example of this notation see E. Q. Adams, *J. Phys. Chem.*, **26,** 644 (1922).

[1] Hovorka with Rodebush, THIS JOURNAL, **47,** 614 (1925).

[2] Lewis and Randall, "Thermodynamics," McGraw-Hill Book Co., New York, **1923,** p. 342.