Erratum: Our Knowledge of the Atomic Constants *F*, *N*, *m*, and *h* in 1947, and of Other Constants Derivable Therefrom

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We wish to correct an error which we have discovered in the values quoted in Table VIII, pp. 106–107. The source of the error is in using an incorrect "origin" value of h_0 for the computation of the least squares fitted value of the Planck constant from the relation

$$h = h_0(1+\bar{x}_h\cdot 10^{-4}).$$

The correct values are

$$h_0 = 6.63430\times 10^{-27} \text{ erg sec.}$$
$$\bar{x}_h = -15.93;$$

hence

$$h = 6.62373\times 10^{-27} \text{ erg sec.}$$

The least squares adjustment (i.e., the solution for the values x_F, x_N, x_h) was correctly carried out and

Table VIII. Least squares fitted values of the atomic constants.
(Essentially 1947 values corrected March 18, 1949, for a small numerical error.)

F	Faraday	9649.6 ± 0.7 e.m.u. equiv.$^{-1}$ (chemical scale)
		9652.2 ± 0.7 e.m.u. equiv.$^{-1}$ (physical scale)
N	Avogadro's number	$(6.0235\pm0.0004)\times10^{23}$ (chemical)
		$(6.0251\pm0.0004)\times10^{23}$ (physical)
h	Planck's constant	$(6.6237\pm0.0011)\times10^{-27}$ erg sec.
m	Electron mass	$(9.1055\pm0.0012)\times10^{-28}$ g
e	Electronic charge	$(4.8024\pm0.0005)\times10^{-10}$ e.s.u.
		$(1.60199\pm0.00016)\times10^{-20}$ e.m.u.
h/e		$(1.37926\pm0.00009)\times10^{-17}$ erg sec. e.s.u.$^{-1}$
e/m	Specific electronic charge	$(1.75936\pm0.00018)\times10^{7}$ e.m.u. g^{-1}
		$(5.2741\pm0.0005)\times10^{17}$ e.s.u. g^{-1}
h/m		(7.2744 ± 0.0007) cm^2 sec.$^{-1}$
α	Fine structure constant	$(7.2978\pm0.0004)\times10^{-3}$
α^2		$(5.3258\pm0.0005)\times10^{-5}$
$1/\alpha$		137.027 ± 0.007
$h/(mc)$	Compton wave-length	$(2.42661\pm0.00025)\times10^{-10}$ cm
$(1/4\pi c)e/m$	Zeeman displacement per gauss	$(4.6703\pm0.0005)\times10^{-5}$ cm^{-1} gauss^{-1}
$a_0=h^2/(4\pi^2me^2)$	"First Bohr Radius"	$(0.529210\pm0.000028)\times10^{-8}$ cm
$a_0'=a_0(1-\alpha^2)^{\frac{1}{2}}$	Separation of electron and proton in the ground state of H^1	$(0.529196\pm0.000028)\times10^{-8}$ cm
$a_0''=a_0'R_\infty/R_H$	Radius of the electron orbit, referred to center of mass for normal H^1	$(0.529484\pm0.000028)\times10^{-8}$ cm
$(1/16)R_H\alpha^2$	Doublet separation in hydrogen	(0.365076 ± 0.000038) cm^{-1}
σ	Stefan-Boltzmann constant	$(5.6716\pm0.0023)\times10^{-5}$ erg cm^{-2} deg.$^{-4}$ sec.$^{-1}$
$c_1=8\pi hc$	First radiation constant	$(4.99045\pm0.0008)\times10^{-15}$ erg cm
$c_2=hc/k$	Second radiation constant	(1.43853 ± 0.00019) cm deg.
$\lambda_{\max}T$	Wien displacement law constant	(0.289728 ± 0.000039) cm deg.
$\mu_1=he/(4\pi m)$	Bohr magneton	$(0.92736\pm0.00017)\times10^{-20}$ erg gauss^{-1}
$(3k/N)^{\frac{1}{2}}$	Multiplier of (Curie constant)$^{\frac{1}{2}}$ to give magnetic moment per molecule	$(2.62196\pm0.00017)\times10^{-20}$ (erg mole deg.$^{-1}$)$^{\frac{1}{2}}$
h/k	Atomic specific heat constant $=c_2/c$	$(4.7987\pm0.0007)\times10^{-11}$ sec. deg.
$\mu=mH^+/H$	Reduced mass of electron in the hydrogen atom	$(9.1006\pm0.0012)\times10^{-28}$ g
$8\pi^2m/h^2$	Schrödinger constant for fixed nucleus	$(1.63866\pm0.00039)\times10^{27}$ erg^{-1} cm^{-2}
$8\pi^2\mu/h^2$	Schrödinger constant for the hydrogen atom	$(1.63777\pm0.00039)\times10^{27}$ erg^{-1} cm^{-2}
mN	Atomic weight of the electron	$(5.4847\pm0.0006)\times10^{-4}$ (chemical)
		$(5.4862\pm0.0006)\times10^{-4}$ (physical)
H^+/mN	Ratio, proton mass to electron mass	1836.57 ± 0.20
λ_0	Wave-length associated with 1 ev	$(12394.8\pm0.9)\times10^{-8}$ cm
ν_0	Frequency associated with 1 ev $=10^8e/(hc)$	$(2.41856\pm0.00017)\times10^{14}$ sec.$^{-1}$
$\bar{\nu}_0$	Wave number associated with 1 ev	8067.9 ± 0.6 cm^{-1}
$E_0=e\cdot10^8/c$	Energy associated with 1 ev	$(1.60199\pm0.00016)\times10^{-12}$ erg
h/e	Potential associated with unit frequency	$(1.37926\pm0.00009)\times10^{-17}$ e.s.u.
$E_1=hc$	Energy associated with unit wave number	$(1.98564\pm0.00032)\times10^{-16}$ erg
$v_0=[2\cdot10^8(e/m)]^{\frac{1}{2}}$	Speed of 1 ev electron	$(5.93188\pm0.00030)\times10^{7}$ cm sec.$^{-1}$
	Conversion factor from atomic mass units to Mev	1 a.m.u. $=(931.04\pm0.07)$ Mev
mc^2	Energy equivalent of electron mass	(0.51079 ± 0.00006) Mev
$(R_0/F)10^{-8}$	Energy associated with 1°K	$k=(0.86163\pm0.00008)\times10^{-4}$ ev
	"Temperature" associated with 1 ev	(11605.9 ± 1.0)°K
n_0	Loschmidt's number	$(2.68731\pm0.00019)\times10^{19}$ cm^{-3}
k	Boltzmann's constant	$(1.38032\pm0.00011)\times10^{-16}$ erg deg^{-1}
S_0	Sakur-Tetrode constant	$S_0/R_0=-5.57215\pm0.00037$
		$S_0=(-46.3289\pm0.0038)\times10^{7}$ erg mole^{-1} deg.$^{-1}$

Auxiliary constants used are the same as those previously published.

only our final answers are affected. The correction entails raising the value of h quoted in our paper by approximately 1 part in 22,000 and, therefore, affects all of the computed values which involve h. Since the relative error in our least squares value of h is 1.6×10^{-4}, the correction in almost all cases is only of the order of one-third to two-thirds the probable error quoted. In only one instance, the Bohr radius (and its related radii), is the effect of the correction outside the stated probable error. (It must be remembered that probable errors are computed by projections, onto the appropriate axes, of the ellipsoid of error rather than by the more usual "propagation of errors.")

The isometric consistency charts, Figs. 9 and 10 are, nevertheless, correct, having been constructed from the least squares values of x_F, x_h, and x_N which are unaffected by our error.

It should be definitely pointed out that this is *by no means a re-evaluation of the constants* and does not include any new data, such as the calculation of α by Bethe and Longmire,[1] the redetermination of h/e from the Duane-Hunt limit by Schwarz and Bearden,[2] or the measurement of the wave-length of annihilation radiation by DuMond, Lind, and Watson.[3] All these must be considered in any evaluation of the constants which claims to be up-to-date. Since a careful redetermination of the Faraday is, we are informed, under way at the National Bureau of Standards, we believe that a re-evaluation of the situation should be postponed until this result is available. The values given here are no more than the corrected 1947 values.

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[1] H. A. Bethe and C. Longmire, Phys. Rev. **75**, 306 (1949).
[2] G. Schwarz and J. A. Bearden, Phys. Rev. **75**, 1304 (1949).
[3] DuMond, Lind, and Watson, Phys. Rev. **75**, 1226 (1949).