m. p. 192°, *Anal.* C, 76.1; H, 10.0; benzoate, m. p. 229°, *Anal.* C, 78.2; H, 9.1. This material differed from tigogenin and sarsasapogenin by direct comparison. However, the authors failed to note its similarity to diosgenin. Thus, diosgenin isolated from *Dioscorea tokora* [Fujii and Matsukawa, *J. Pharm. Soc. Japan*, **56**, 408 (1936)] has the following properties: m. p. 200°, $[\alpha]^{19}_D$ $-119°$ in chloroform, *Anal.* Calcd. for $C_{27}H_{42}O_3$: C, 78.2, H, 10.2.; acetate, m. p. 190°, *Anal.* Calcd. for $C_{29}H_{44}O_4$: C, 76.3; H, 9.7.; benzoate, m. p. 237°, *Anal.* Calcd. for $C_{34}H_{46}O_4$: C, 78.7; H, 9.0.

We have obtained a sample of palm kernels identified for us as *Balanites aegyptica.* The sapogenin fraction contained diosgenin as its principal constituent. The identification was made by the melting point and mixed melting point determinations on the free genin, 206°; acetate, 200°; and benzoate, 238°. Catalytic reduction of its acetate gave tigogenin acetate, m. p. and mixed m. p., 202°. A mixture containing the latter and the original acetate melted 186°.

We thank Parke, Davis and Company for their help.

RUSSELL E. MARKER
R. B. WAGNER
SCHOOL OF CHEMISTRY AND PHYSICS DALE P. J. GOLDSMITH
THE PENNSYLVANIA STATE COLLEGE PAUL R. ULSHAFER
STATE COLLEGE, PENNA. CLARENCE H. RUOF

RECEIVED APRIL 21, 1943

FURTHER REVISION OF THE CONSTANTS OF THE DEBYE-HÜCKEL THEORY

Sir:

In a recent note Stonehill and Berry[1] have published revised values for the constants h and g in the Debye–Hückel expression for the logarithm of the activity coefficient of a z_1,z_2-valent electrolyte in aqueous solution at 25°

$$\log_{10} \gamma = \frac{-hz_1z_2\sqrt{I}}{1 + ga\sqrt{I}} - \log_{10} (1 + 0.018\Sigma m_i)$$

On the basis of the physical constants tabulated by Childs[2] they find $h = 0.5103$ and $g = 0.3290 \times 10^8$. They indicate some of the possible implications of this change from the values $h = 0.5065$ (or 0.5056) and $g = 0.3287 \times 10^8$ (or 0.3288×10^8) based on the old values of the fundamental constants and used so widely by numerous authors.[3] The values of h and g established by Stonehill and Berry are, however, not final. The fundamental constants given by Birge[4] differ somewhat from, and supersede, those listed by Childs and used by Stonehill and Berry in their calculations. On the basis of the Birge constants $e = 4.8025 \times 10^{-10}$ e. s. u. (instead of Childs' 4.803×10^{-10}), $k = 1.38047 \times 10^{-16}$ erg/°C. (instead of 1.379×10^{-16}), $N = 6.0228 \times 10^{23}$ (instead of 6.028×10^{23}), $T_0 = 273.16$ (instead of 273.18) and on the basis of Wyman's[5] value 78.54 for the dielectric constant of water at 25° we find $h = 0.5091$ and $g = 0.3286 \times 10^8$. Calling d and t the ratios $D/78.54$ and $T/298.16$ we have, in general

$$h = \frac{0.5091}{(dt)^{3/2}} \text{ and } g = \frac{0.3286 \times 10^8}{(dt)^{1/2}}$$

The revised constant l for the osmotic coefficient formula

$$1 - G = lz_1z_2\sqrt{I}\cdot\sigma(ga\sqrt{I})$$

is 0.3908 for water at 25° and, in general

$$l = 0.3908/(dt)^{3/2}$$

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[1] Stonehill and Berry, THIS JOURNAL, **64**, 2724 (1942).

[2] Childs, "Physical Constants," Methuen, London, 1939.

[3] On the basis of the constants tabulated by Fowler in his "Statistical Mechanics" (Cambridge University Press, 1936) Van Rysselberghe and Eisenberg (THIS JOURNAL, **61**, 3030 (1939), **62**, 451 (1940)) and Eisenberg (Thesis, Stanford University, 1942) used the values $h = 0.5059$ and $g = 0.3287 \times 10^3$.

[4] Birge, *Rev. Mod. Phys.*, **13**, 233 (1941).

[5] Wyman, *Phys. Rev.*, **35**, 623 (1930).

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF OREGON
EUGENE, OREGON PIERRE VAN RYSSELBERGHE

RECEIVED FEBRUARY 19, 1943

CONSTANTS OF THE DEBYE-HÜCKEL THEORY

Sir:

In accordance with the revised constants of Birge quoted in the preceding Communication of Dr. Van Rysselberghe, the equations of Scatchard and Epstein[1] for the Debye–Hückel limiting-law expressions in terms of concentrations in moles per kilogram of water should also be revised to give

$$\ln \gamma_k/z_k^2 \sqrt{\mu} = 1.1244\ [1 + 0.15471\ (t/100) + 0.03569\ (t/100)^2 + 0.02389\ (t/100)^3]$$

$$\ln \gamma_k/z_k^2\kappa = 3.470 \times 10^{-8}\ [1 + 0.10194\ (t/100) + 0.04269\ (t/100)^2 + 0.00976\ (t/100)^3]$$

$$\kappa/\sqrt{\mu} = 0.3240 \times 10^8\ [1 + 0.05217\ (t/100) - 0.00916\ (t/100)^2 + 0.00888\ (t/100)^3]$$

in which γ_k is the ratio of the activity of the k'th ion species to its molality, z_k is its valence, t the centigrade temperature, μ the ionic strength,

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[1] G. Scatchard and L. F. Epstein, *Chem. Rev.*, **30**, 211 (1942).