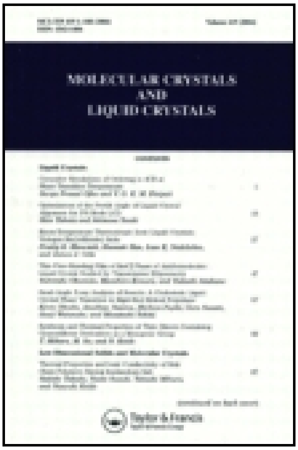

Molecular Crystals and Liquid Crystals
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmcl16

Erratum

W. J. A. Goossens [a]

[a] Philips Research Laboratories, Eindhoven, The Netherlands

Version of record first published: 17 Oct 2011.

To cite this article: W. J. A. Goossens (1986): Erratum, Molecular Crystals and Liquid Crystals, 138:1, 411-412

To link to this article: http://dx.doi.org/10.1080/00268948608071773

Mol. Cryst. Liq. Cryst., 1986, Vol. 138, pp. 411–412
0026-8941/86/1384–0411/$10.00/0

Erratum

Bulk, Interfacial and Anchoring Energies of Liquid Crystals

Volume 124, pp. 305–331 (1985)

W. J. A. GOOSSENS
Philips Research Laboratories, Eindhoven—The Netherlands

The discussion given in appendix B of the paper "Bulk, Interfacial and Anchoring Energies of Liquid Crystals" has missed its mark; the statement concerning ref. 67, l.c., is not correct. To come to the point consider again an insulating liquid crystal between two parallel electrodes at a distance d along z. Quite generally one had $D = 4\pi\sigma$ and $V = \int_0^d dz\, E\,(\vartheta) = D \int_0^d dz/\epsilon(\vartheta)$, $\vartheta = \vartheta(z)$, where σ is the surface charge density at the electrodes and V the voltage across the electrodes; both V and D are independent of z. With a given surface charge density at the electrodes the total free energy per unit area of the cell is given by,

$$\mathcal{F} = \mathcal{F}_0 + \int_0^d F_{\text{el.}}\, dz + \frac{D^2}{8\pi}\int_0^d \frac{dz}{\epsilon(\vartheta)},$$

which indeed after minimization yields

$$\frac{d}{dz}(F_{\text{el.}}) = \frac{D^2}{8\pi}\frac{d}{dz}\left(\frac{1}{\epsilon(\vartheta)}\right), \quad \text{where } D = 4\pi\sigma$$

is the independent variable. With a given voltage applied across the cell one should minimize the free energy,

$$\tilde{\mathcal{F}} = \mathcal{F} - \int_0^d \frac{E.\ D.}{4\pi}\, dz = \mathcal{F}_0 + \int_0^d F_{el.}\, dz - \frac{V^2}{8\pi} \frac{1}{\int_0^d \frac{dz}{\epsilon(\vartheta)}}$$

where V is the independent variable. The variation of the field energy through a variation of $\vartheta(z)$ with $\lambda\eta(z)$ is determined by,

$$\frac{-V^2}{8\pi}\left(\frac{d}{d\lambda}\frac{1}{\int_0^d \frac{dz}{\epsilon(\vartheta+\lambda\eta)}}\right)_{\lambda=0} = \frac{-1}{8\pi}\left(\frac{V}{\int_0^d \frac{dz}{\epsilon(\vartheta)}}\right)^2 \int_0^d dz\, \frac{\eta}{\epsilon^2(\vartheta)}\frac{\partial\epsilon(\vartheta)}{\partial\vartheta}$$

$$= \frac{D^2}{8\pi}\int_0^d dz\, \eta\frac{\partial}{\partial\vartheta}\left(\frac{1}{\epsilon(\vartheta)}\right)$$

yielding again
$d/dz\ (F_{el.}) = D^2/8\pi\ d/dz\ (1/\epsilon(\vartheta))$, however with the dependent variable D determined by $D = V/\int_0^d dz/\epsilon(\vartheta)$