THE THERMODYNAMICS OF MAGNETIZATION

By E. A. GUGGENHEIM

Communicated by R. C. Evans

Received 26 April 1949

A paper under the above title (1) by G. H. Livens was published recently in this journal. The main object of this paper appears to be to show that the treatment of the same subject (2) by myself is unsound. I shall not attempt to refute Professor Livens's opinions. His views concerning magnetic energy have already been criticized by others (3) more expert than myself. I merely wish to draw attention to two completely untrue statements of fact in Professor Livens's paper, namely the following:

(*a*) On p. 538 "Guggenheim writes therefore

$$\delta E = \delta h + \frac{1}{4\pi} H_\alpha \delta B_\alpha."$$

In fact I have written nothing of the sort.

(*b*) On p. 544 "Guggenheim derives eventually the equation

$$\frac{1}{H}\frac{\partial}{\partial B}\left(\frac{1}{\xi}\right)_H = \frac{1}{B}\frac{\partial}{\partial H}\left(\frac{1}{\zeta}\right)_B \tag{4·13}$$

to represent what he describes as the most general equation of state."

In fact the equation which I described as the most general form of the magnetic equation of state is the completely different equation

$$d\log T = \frac{dH}{H\xi} + \frac{dB}{B\zeta}, \tag{4·12}$$

whereas equation (4·13) is an identity following from my definitions of ξ and ζ.

The reader can, by consulting my paper, verify that both Professor Livens's statements are false.

REFERENCES

(1) Livens, G. H. *Proc. Cambridge Phil. Soc.* 44 (1948), 534.
(2) Guggenheim, E. A. *Proc Roy. Soc.* A, 155 (1936), 70.
(3) Stratton, J. A. *Electromagnetic Theory* (New York, 1941), p. 146.

The University
Reading

https://doi.org/10.1017/S0305004100025093 Published online by Cambridge University Press