

But the expression for the absolute expansion term—

$$\alpha T = \frac{\beta + K}{\rho} \dots \dots \dots (5^1)$$

is also a very simple one.

To interpret equation (7) numerically—

The quantity c/ρ will be recognised as the atomic heat, which is nearly the same constant for all ordinary gases, and equal in c.g.s. energy units to—

$$0.2375 \times 0.001293 \times (42 \times 10^8) = 0.001294 \times 10^6 \text{ ergs per c.c. for dry air.}$$

The actual change of temperature per atmosphere, observed as the final result of the irreversible Joule and Thomson expansion, was, for air, a lowering of about a fifth of a degree, or more exactly 0.208 ; so that—

$$\frac{\theta}{\Pi} = \frac{0.208}{10^6 \text{ dynes per sq. cm.}}$$

Hence, since ergs per c.c. are the same as dynes per sq. cm., the value of what we have just reckoned as the dimensions of the whole term $c/\rho \theta / \Pi$ comes out right as a pure number (being plainly a ratio of two energies when ρ is written m/v); and the correction factor for air equals—

$$1 + 0.001294 \times 0.208 = 1.00027.$$

At zero Centigrade the expansibility of air was measured by Regnault as 0.0036706 . Wherefore the absolute temperature corresponding to zero Centigrade is, in accordance with equation (7)—

$$\frac{1.00027}{0.0036706} = 273.17.$$

ELECTRICAL THEORY OF MATTER.

On the great modern region of physics centring round an electrical theory of matter, Lord Kelvin's mind was somewhat conservative; as perhaps it was in electricity generally, whenever results could not be obtained by straightforward dynamics or by energy calculations. In other directions he only advanced under protest, as it were, towards the goal at which others were enthusiastically working. Nevertheless, we owe to him some pioneering work even in this branch.

Comparatively modern speculation and calculation on the structure of an atom are contained in a remarkable paper by Lord Kelvin, published in the *Phil. Mag.* for 1901 under the curious title "*Æpinus Atomised.*" It is reproduced in the volume of Baltimore lectures as Appendix E. It was probably the first attempt to work out the statics of an atom, according to a simple conception the major consequences of which can be traced with comparative ease, viz., that of a spherical portion of uniform positive electricity in which minute negative charges are sown like specks; being attracted towards the centre of the sphere according to the law of direct distance, and repelling each other according to the inverse square law.

COSMIC CALCULATIONS.

Of the work of Lord Kelvin in elasticity, I shall here say nothing beyond the remark that his kinetic view of elasticity often seems to me one of the most suggestive and ultimately pregnant of all his theories.

His papers on celestial dynamics are very remarkable and lucid, though we may not feel that they represent the last word on the question; any more than the last word has been said as to the age of the sun or of the earth. The fact that after a lifetime of immersion in all the intricacies of natural philosophy Lord Kelvin still postulated an origin or beginning for the material universe—a beginning when it was essentially different, not only locally but universally, from its present condition—and that he endeavoured to conceive what it might then have been like, in those early times—is a notable circumstance and one of general interest. To me there appears no reason for calling those times "early" rather than "late"; nor would I suppose a beginning or ending at all, either for space or for what is in space, other than such beginnings or endings as we might detect, or may hope to detect, somewhere, even now.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

PROF. WÜLFING has been appointed to the chair of mineralogy in the University of Heidelberg. We notice also that the same university has just celebrated the fiftieth anniversary of the doctorate of Prof. Georg Quincke, professor of physics in the University.

THE correspondence between the Colonial Secretary (Mr. J. C. Smuts) and the council of the Transvaal University College relating to the organisation of higher education in the Transvaal has just been issued as a Blue-book (T.G.—24—1908). The question of a Transvaal university is not considered yet to be ripe, the proposals at present being for the establishment of a university college. If the recommendations of the committee appointed by the Colonial Secretary be carried out, the Transvaal University College will be a federation, under one council, of three institutes. The technical courses would be assigned to the Johannesburg branch, the literary and science courses to Pretoria, and the agricultural work would be centred at Frankenburg. It has been decided to proceed at once to carry out the scheme so far as it relates to the allocation of the various departments of work and study to the Pretoria and Johannesburg branches respectively. For the Frankenburg branch it is hoped that 200,000l. will be available from the Beit bequest, but this part of the scheme is deferred. Certain questions relating to the constitution of the reorganised college are also held in abeyance. It is obvious that the three branches will have but a slender bond of union; but after reading their report we are inclined to accept the view of the committee, that the difficulties in the way of finding any one place where the branches can be developed side by side are insurmountable.

The *British Medical Journal* for August 15 gives its readers a lengthy report of the discussion by the British Medical Association at Sheffield on the education of the medical student. The speakers included Profs. Starling, Armstrong, Sherrington, Sims Woodhead and Osler, Sir Felix Semon, Dr. Dawson Turner, Dr. Buist, and Dr. Russell Wells. The discussion formed part of the proceedings of the Section of Physiology, but the list of speakers guaranteed adequate handling of their theme in respect of scientific as well as clinical aim. It appeared to be widely held that (1) the period devoted to preliminary and intermediate study should be curtailed; (2) closer consideration should be paid during the intermediate course to the practical needs of the future medical man—e.g. biological studies should have a physiological rather than a morphological bias; (3) more clinical study is required in the later periods of the training, especially practice of diagnosis; (4) there should be fewer lectures and more demonstrations. The leading article in the same number of the journal is devoted to a consideration of this discussion jointly with the new regulations for the medical curriculum recently promulgated by the University of London. The journal approves the decision of the University to extend the final part of the curriculum to thirty-six months. We may point out that we are still behind the foremost Continental countries in our estimate of the time required to train a qualified medical practitioner.

A WELL printed and illustrated pamphlet has been issued by the British Education Section of the Franco-British Exhibition under the title "*A Short History of National Education in Great Britain and Ireland.*" In the article which appeared in *NATURE* for August 13 attention was given to the manner in which the exhibition, both as a whole and in detail, illustrates national progress, whether such progress be viewed from the pedagogic or from the administrative aspect. The booklet now before us deals with the latter aspect, and its author—Mr. T. L. Humberstone—gives a broad and clear outline of his subject. Too little is said of private schools, but the history of public provision for education during the last three centuries is made clear. The awakening of England and Wales during the last century to their responsibility for educating their citizens is traced with judgment, and mention is made of the latest development of this sense of responsibility shown by the medical inspection of school children. The value of this production is much in excess of its price—it is published by Messrs. King at 3d.