

“The Specific Heats of Metals and the Relation of Specific Heat to Atomic Weight.—Part III.” By W. A. TILDEN, D.Sc., F.R.S., Professor of Chemistry in the Royal College of Science, London. Received March 9,—Read March 17, 1904.

(Abstract.)

The object of the experiments, of which an account is given in this paper, was to determine whether the atomic heats of the elements entering into combination are preserved in the compound at all temperatures, previous results obtained by the author and others having shown that the specific heats of metals of small atomic weight, such as aluminium, increase very rapidly with rise of temperature.

As it is not possible to determine the specific heat of sulphur throughout a long range of temperature, tellurium was chosen for experiment. Compounds of tin, silver and nickel with tellurium were prepared, and two alloys of silver and aluminium. The average specific heats of all these elements, except tin, were determined over various intervals from the boiling point of liquid oxygen to nearly 500° C. in the case of the less fusible elements, a range of about 680° C. From these mean specific heats the true specific heats at intervals of 100 Centigrade degrees absolute temperature were calculated, and from the specific heats the atomic heats were deduced. The mean specific heats of the compounds, formed by their union, were also determined, and from these data the molecular heats of the compounds calculated. On comparing the sum of the atomic heats of the elements present with the molecular heat of the compound at the successive temperatures, it was found that there is throughout a close concordance. The order of difference may be shown by one example—

Nickel Telluride, NiTe.

Temperature, absolute.	Sum of atomic heat of Ni and Te.	Molecular heat of NiTe.
100°.....	9·20	8·38
200°.....	11·08	11·35
300°.....	12·22	12·41
400°.....	13·00	12·92
500°.....	13·49	13·15
600°.....	13·85	13·28
700°.....	14·11	13·35

The results of these experiments show that Neumann's law is approximately true, not only at temperatures from 0° to 100° C., but at all temperatures. They thus support the view that the specific heat of

a solid is determined by the nature of the atoms composing the physical molecules, and is not a measure of the thermal work done in expansion.

The paper concludes with a discussion of the relations of specific heat to atomic weight in the solid, liquid and gaseous states.

“Further Researches on the Temperature Classification of Stars.”

By Sir NORMAN LOCKYER, K.C.B., LL.D., F.R.S. Received January 30,—Read February 18, 1904.

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1. *Historical Review.*

In my first Bakerian Lecture in 1873 I dealt with the question of the spectra of stars, and pointed out that the facts accumulated up to that time by Rutherford and others led to the view that in the reversing layers of the sun and stars various degrees of dissociation are at work.

I also suggested that the stellar evidence indicated that one of the results of dissociation temperatures could be to “prevent the coming together of atoms which at the temperature of the earth, and at all artificial temperatures yet obtained here, compose the metals, the metalloids, and compounds.”*

In a subsequent communication to the Paris Academy I wrote,† “Il semble que plus une étoile est chaude plus son spectre est simple, et que les éléments métalliques se font voir dans l'ordre de leurs poids atomiques.”

This last generalisation rested upon the great preponderance of hydrogen in certain stars, which I classed as hottest on the ground that the blue end of the spectrum was open. Of the spectrum of helium,

* ‘Phil. Trans.,’ vol. 164, p. 479.

† ‘Comptes Rendus,’ vol. 77, 1873, p. 1357.