SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, October 26.—Prof. A. W. Rücker, F.R.S., President, in the chair.—The meeting was held in the rooms of the Chemical Society, Burlington House.—In opening the proceedings the President said the occasion might be regarded as another sign that the boundary between Chemistry and Physics was breaking down. On behalf of the Council he tendered the thanks of the Physical Society to the Chemical Society for the use of the rooms.—Prof. H. E. Armstrong, President of the Chemical Society, said his Council offered a cordial welcome to the Physical Society. The change, he thought would prove of much greater importance than a mere removal. Now that the childhood of the Physical Society was passed, its manhood involved new responsibilities, and great opportunities for good presented themselves. The Physical Society of London ought now to become the head-centre of physics in the United Kingdom. He (Dr. Armstrong) was pleased to learn that the Society had undertaken the preparation and publication of abstracts of physical papers appearing in foreign periodicals, and said the matter was of such great importance that it should be done thoroughly. In a work of such a magnitude, he regarded the co-operation of other societies, such as the Institution of Electrical Engineers, as absolutely necessary.—The President, in acknowledging the welcome, said the Physical Society was extremely obliged to the President and Council of the Chemical Society for the great benefits conferred. Dr. Armstrong's advice to go ahead would not be forgotten. He then announced that at future meetings tea would be provided for members at 4.30.—The exhibition of a voltameter by Mr. Naber was postponed.—Mr. E. H. Griffiths read a paper on the influence of temperature on the specific heat of aniline. After pointing out that most observations of specific heat depend on water, whose capacity for heat varies considerably with temperature, the author said large differences existed between the values obtained by different observers as the latent heats of evaporation of water and other liquids, and these differences were probably due to the variability of the water standard, which had been erroneously assumed constant. Precise measurements in calorimetry were of such great importance that the exact relation between the capacity for heat of water and its temperature should be completely determined. With apparatus such as he had used with aniline, this could be done in six months, provided someone could be found who could devote his whole time to the subject. The results of his own experiments were expressed in terms of the capacity for heat of water at 15° C. (at which $J = 4{\cdot}198 \times 10^{7}$ ergs.), and hence were referred to a definite standard. A great desideratum in calorimetric work was a calorimeter whose surroundings could be kept at a very constant temperature. This he had obtained by using a tank holding about 20 gallons of water, in which a steel vessel, shaped like a hat-box with hollow sides and bottom, was immersed. The cavity was filled with about 70 pounds of mercury, and served as the bulb of a thermometer; a tube communicating with this bulb acted as a regulator to control the gas supply which heated the water in the tank. The tank water was circulated rapidly by a screw-propeller. Under ordinary conditions the temperature of the outside of the steel chamber could be kept constant within 1/100° C. The calorimeter itself was of brass, and suspended by glass tubes from the lid of the steel chamber. A stirrer worked by an electromotor kept the contents in rapid motion. In the experiments on aniline, heat was supplied to the liquid in the interior by maintaining known potential differences (equal to some multiple of the E.M.F. of a Clark's cell) between the ends of a coil of German silver wire placed inside. The rate of rise of temperature of the inside over the outside was measured by platinum thermometers, one of which was placed in the calorimeter, and the other embedded in the walls of the steel vessel surrounding the calorimeter. By this means differences in temperature of 1/1000 of 1° C. could be detected with certainty. A special method of adjusting the potential difference between the ends of the German silver wire was employed, by which the constancy could be maintained within 1 part in 10,000. To minimise corrections arising from heat generated by stirring the liquid, and that lost by radiation, &c., from the calorimeter, the experiments were made about temperatures at which these corrections balanced each other; the rise of temperature was then due to the electric supply alone. The specific heat, S_1 of the liquid at temperature θ_1 could then be determined from the formula

$$\frac{d\theta_1}{dt} = \frac{E^2}{JR_1(S_1M + w_1)}$$

where $\frac{d\theta_1}{dt}$ = rate of rise of temperature at temperature θ_1
J = mechanical equivalent of heat,
E = potential difference between the ends of the coil,
R_1 = resistance of the coil,
M = mass of liquid,
and w_1 = water equivalent of calorimeter at temperature θ_1.

Experiments were made with different values of E, and two widely different masses of liquid were used. The author was thus enabled to find S_1 without knowing w_1. Having found S_1, the water equivalent of the calorimeter could then be determined. Many important details of construction and manipulation of the apparatus, as well as the method employed in reducing the results, are given in the paper. The final values for S_1 and w_1 at several temperatures are given below.

Temperature.	Specific heat of aniline.	Water equivalent of calorimeter.
15° C.	0·5137	79·82
20	0·5155	80·11
30	0·5198	80·90
40	0·5244	82·19
50	0·5294	83·39

The aniline employed was supplied by Messrs. Harrington Bros. as "pure colourless," but had initially a light brown tinge. After being in use some time, the colour had darkened considerably, but its specific heat had not sensibly changed. Recently he had tried a hydrocarbon liquid which promised to be still more satisfactory as a standard liquid in calorimetry. In the course of his remarks the author said a name for "capacity of heat per unit volume" was greatly needed, and invited suggestions. Dr. Armstrong thought the author had made a particularly happy selection in aniline, for it could now be obtained in any quantity absolutely pure. When pure it did not discolour on exposure, and would probably be very satisfactory as a standard liquid. He doubted whether any hydrocarbon could be better. Prof. Ayrton congratulated the author on the extreme accuracy obtained. Recently he had arranged an experiment for determining the mechanical equivalent of heat by the electrical method, which gave very accurate results without any corrections whatever being necessary. Prof. S. P. Thompson thought the whole phraseology of specific heat required revising. Prof. Perry agreed with Mr. Griffiths that a name for "capacity for heat per unit volume" was greatly needed, and Mr. Lucas suggested "heat density," but this was not satisfactory. Dr. Sumpner said most text-books on physics attributed the advantage of the mercury thermometer to the low specific heat of mercury, whereas the capacity for heat per unit volume was the important factor. Mr. Watson inquired to what temperature the alloy which the author had used to connect glass to metal had been tested? The President said the paper was of great importance because it dwelt with the application of electrical methods to thermometry. The mercury thermometer had been quite superseded for work such as had just been described. Mr. Griffiths, in reply to Mr. Watson, said the alloy had been used successfully between 10° and 62° C. It gave way at 71° C. He was glad to learn from Dr. Armstrong that aniline could now be got pure. Prof. Ramsay had written to say he did not think the slight impurities in ordinary aniline would have much effect on its specific heat. Mr. Blakesley asked if aniline could be taken as pure if it did not change colour on exposure. Dr. Armstrong, in reply, said yes, if the boiling point was also constant.

PARIS.

Academy of Sciences, November 5.—M. Lœwy in the chair.—On an apparatus serving to demonstrate certain consequences of the theorem of areas, by M. Marcel Deprez. This is an apparatus designed to show that a body passing freely through space may rotate on its own axis without suffering the application of any exterior force, such rotation being produced by interior movements of parts of its system.—On the theorem of areas, by M. P. Appell.—On the theory of flow for a weir with depressed or partly submerged liquid sheet, in the case where a horizontal *armature* gives the inferior maximum contraction, by M. J. Boussinesq.—On the vaporisation of carbon, by M. Henri Moissan. The heat of the electric furnace enables carbon to be volatilised; the sublimed carbon is always deposited under the form of graphite at ordinary pressures, and there is no evidence whatever of the liquefaction of the carbon, for instance the lid of a carbon crucible did not adhere when the whole mass had been converted into graphite, and a carbon needle heated in a carbon tube did not in any case become attached to the latter. Previous experiments have, however, shown that under great pressures carbon may be fused, and diamond is then formed.—New observations on the menhirs of the Meudon woods, by M. Berthelot.—Note by M. Maurice Lévy accompanying the presentation of his "Study of the mechanical and electrical methods of traction of boats." The author gives a short account of the contents of the first volume of his work dealing with cable traction only.—M. Bouquet de la Grye, in the name of the Bureau des Longitudes, presented the "Connaissance des Temps" for the year 1897. This volume contains, on the maps of solar eclipses, the curves passing through the points on the earth at which the commencement and end of the eclipse are simultaneous. The ecliptic elements of the great planets and their satellites, including their elongations and the elements of Saturn's ring, are also given.—Observations of the new planet BE, made at Paris Observatory, by M. G. Bigourdan.—The polar snows of Mars, by M. C. Flammarion (see "Our Astronomical Column").—Relations between the vapour pressures of a body in the solid and in the liquid state: influence of pressure on the temperature of fusion, by M. A. Ponsot.—Influence of form on the sensitiveness to light and aberration of the eye, by M. Charles Henry.—Researches on mercuric nitrates, by M. Raoul Varet. The heats of formation are determined. In the dissociation of mercuric nitrate by water the least endothermic of the possible reactions is the one that takes place. Nitric acid, like sulphuric, picric, acetic, and oxalic acids, is displaced completely from mercuric combinations by hydrochloric and by hydrocyanic acids.—On the campholenic acids and the campholenamides, by M. A. Béhal.—On the presence of methyl salicylate in some native plants, by M. Em. Bourquelot.—On the formation of new colonies by *Termes lucifugus*, by M. J. Pérez.—The defence of the organism against parasites among insects, by M. L. Cuénot.—External characteristics of chytridiosis of the vine, by M. A. Prunet.—On a mycobacterial disease of *Tricholoma terreum*, by M. Paul Vuillemin.—Defence of "Saharien" as a name for the last geological period, by M. Mayer-Eymar.—On the presence and distribution of glycogen in tumours, by M. A. Brault.

BERLIN.

Meteorological Society, October 9.—Prof. Hellmann, President, in the chair.—After the President had dwelt on the loss sustained by meteorology owing to the death of von Helmholtz, Dr. Schwalbe spoke of his own endeavours to utilise for scientific purposes the curves of temperature obtained from the "Uranus" pillars. He found among the many meteorological pillars in Berlin which had given continuous records during the years 1892 and 1893, very few whose readings corresponded with those of control instruments. Taking the month of July for each year, he had endeavoured to arrive at the mean daily temperature by taking the mean of the temperatures registered every hour of each day in the month. He found this mean temperature to lie between the values of the expressions $\frac{6+2+10}{3}$ and $\frac{7+2+9+9}{4}$.—Dr. Kassner had instituted observations during the year on cloud-waves, to which, since Helmholtz' researches on the formation of waves when two layers of air of different density and travelling with different velocity move past each other, meteorologists have devoted very special attention. From these it appears that the above form of cloud, consisting mostly of cirrus and cirrocumulus, usually causes deposits. The speaker expressed the wish that thorough and continuous observation of this phenomenon might be made in order to test it.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Integral Calculus: J. Edwards (Macmillan).—A Treatise on Chemistry: Sir H. E. Roscoe and C. Schorlemmer, Vol. 1, new edition (Macmillan).—Reise nach Südindien: E. Schmidt (Leipzig, Engelmann).—Lehrbuch der Petrographie: Dr. F. Zirkel, Dritter Band (Leipzig, Engelmann).—Resultaten der Aetzmethode in der Krystallographischen Forschung: Dr. H. Baumhauer, Text and Atlas (Leipzig, Engelmann).—Electric Lighting and Power Distribution: W. P. Maycock, new edition (Whittaker).—Electric Light Installations: Sir D. Salomons, Vol. 3: Application, 7th edition (Whittaker).—Forest Birds, their Haunts and Habits: H. F. Witherby (K. Paul).—By Order of the Sun to Chile to see his Total Eclipse, April 16, 1893: J. J. Aubertin (K. Paul).—The Vaccination Question: A. W. Hutton (Methuen).—Reports from the Laboratory of the Royal College of Physicians, Edinburgh, Vol. 5 (Edinburgh, Clay).—Dr. William Smellie and his Contemporaries: Dr. J. Glaister (Glasgow, MacLehose).—The Dawn of Civilisation: G. Maspero, translated by M. L. McClure (S.P.C.K.).—Preparatory Physics: Prof. W. J. Hopkins (Longmans).

PAMPHLETS.—The Maya Year: C. Thomas (Washington).—Tableau Métrique de Logarithmes: C. Dumesnil (Paris, Hachette).—On Pedal and Antipedal Triangles: A. S. Ghosh (Calcutta, Patrick Press).—Weismannism once more: H. Spencer (Williams and Norgate).—On the Use of Detached Coefficients in Elementary Algebra: J. D. Paul (Bell).—Pearl and Chank Fisheries of the Golf of Manaar: E. Thurston (Madras).—Die Temperatur: Dr. A. E. Forster (Wien, Hölzel).—Mean Density of the Earth; E. D. Preston (Washington).—Analytische Theorie der Organischen Entwickelung: H. Driesch (Leipzig, Engelmann).—Das Verhältnis der Philosophie, &c.: D. Wetterhan (Leipzig, Engelmann).—Gedächtnisserede auf Hermann von Helmholtz: Th. W. Engelmann (Leipzig, Engelmann).—Grundzüge der Mathematischen Chemie: Dr. G. Helm (Leipzig, Engelmann).—Verhandlungen der Deutschen Zoologischen Gesellschaft auf der vierten Jahresversammlung zu München, den 9, bis 11, April 1894 (Leipzig, Engelmann).

SERIALS.—Science Progress, November (Scientific Press, Ltd.).—Scientific Roll—Climate: Baric Condition, No. 6 (Castle Printing and Publishing Company).—Medical Magazine, November (Southwood).—Zeitschrift für Physikalische Chemie, xv. Band, 2 Heft (Leipzig, Engelmann).—Imperial University, College of Agriculture, Bulletin Vol. 2, No. 2 (Tokyo).—Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. 8, No. 3 (Manchester).—Himmel und Erde, November (Berlin).—American Journal of Science, November (New Haven).—Engineering Magazine, November (Tucker).—Journal of the Sanitary Institute, October (Stanford).—Portfolios of Photographs: Beautiful Britain, Art Series, No. 1. (Werner Co.).—Journal of the Asiatic Society of Bengal, Vol. lxiii. Part 2, No. 2 (Calcutta).

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