

mittee was chiefly concerned with the needs of the children. The intensity of illumination necessary in schoolrooms depends on the nature of the work carried out. It is suggested that for ordinary clerical work the minimum illumination measured at any desk where the light is required should not fall below 2 foot-candles—four members of the committee say  $2\frac{1}{2}$  foot-candles. For special work, such as stitching with dark materials or that in art classes, a minimum of 4 foot-candles is desirable; and for general illumination in assembly-rooms one foot-candle. As regards blackboard lighting, the committee recommends an illumination on the blackboard about 60 per cent. in excess of that prevailing in the rest of the room. To avoid glare it is recommended that no lamps should come within the solid angle subtended at the eye by the blackboard, and a space 2 ft. above it, unless they are completely screened from the eye by a shade impervious to light. With the same object it is suggested that for text-books intended for the use of young children matt paper, sensibly free from prejudicial reflection, should be employed. The use of light-tinted surroundings which serve to diffuse the light is recommended to avoid inconvenient shadows.

### SOCIETIES AND ACADEMIES.

#### MANCHESTER.

**Literary and Philosophical Society**, July 22.—Dr. H. Wilde: Some new multiple relations of the atomic weights of elementary substances, and the classification and transformations of neon and helium. In several of the author's papers on the origin of elementary substances, published by the society (1878-1906), special attention was directed to the seventh series of his classification, on account of the magnitude and importance of its primary members in the economy of nature, viz. nitrogen, silicon, iron, and gold. Silicon in combination with oxygen constitutes more than half the weight of the earth's crust, and is the principal constituent of glass for all the purposes of civilised life. The policy of several writers in doubling the atomic weights of four of the gaseous members of this series, viz. neon, argon, krypton, and xenon, induced the author to review the multiple relations of the seventh series with the important result (1) that six triads are formed out of the eight principal members of the series, in which the sum of the atomic weights of the extreme members is double the atomic weight of the means, and are all multiples of seven. Triads of atomic weights have been fully recognised by Dumas, Faraday, and other philosophical chemists, as indubitable evidence of community of origin, of transmutation, and important factors in the classification of elementary substances. Radium (as was indicated in Dr. Wilde's tables of elements some years previous to its discovery) is one of the synthetic transformations of helium, and is the next higher member of the series to barium, as was since confirmed by Mme. Curie. Helium is also shown in the author's table of 1878 as the analytic transformation ultimate of radium and other members of the second series of elements. The positions of helium and neon, as the transformation ultimates of the second and seventh series respectively, are further interesting in connection with the recent announcements that these elements have been found in glass vessels and tubes in which they had no previous existence. Assuming the reality of these observations, the phenomena not only admit of explication from Dr. Wilde's classifications, but also account for the discordant results obtained by the experimenters engaged in the research. One of the investigators could only find neon, while others, working independently, found helium alone, and in

other cases a mixture of both gases. These results were of sufficient interest to induce the author to ascertain the composition of various glasses used in the arts. The principal and most important constituent of the glasses tabulated by Dr. Wilde is silicon, the transformation ultimate of which is neon. The next important constituents of the glasses are barium, calcium, and lead, all members of the second series of elements, the transformation ultimate of which is helium. The alkali methods, sodium and potassium, are constituents of nearly all glasses, and their transformation ultimates (with others of the first series) will be hydrogen and neon, but without helium. All the silicates of the first and second, and some of other series, are easily vitrified in small quantities in laboratory crucibles. Their spectra can then be examined during electrification in tubes (under suitable conditions of temperature and pressure) for the discovery of new elements and the identification of those already known.

#### PARIS.

**Academy of Sciences**, August 4.—M. F. Guyon in the chair.—J. Boussinesq: The complete determination, by its partial differential equations, of the problem of slow regularised movement of a heavy liquid mass, in the midst of another fluid mass, indefinite and at rest, and equally incompressible.—G. Charpy and A. Cornu: The displacement of the critical points of iron by the addition of silicon. Contradictory results on this subject have recently been published by Vigouroux and Baker. Seven alloys have been prepared by the authors from Swedish iron to which increasing quantities of ferro-silicon were added. Complete analyses are given of the seven alloys, the silicon ranging from 0.11 to 6.10 per cent. The critical points were determined by the velocity of cooling method, the curves being recorded automatically with the double Saladin-Le Chatelier galvanometer. The point  $a_3$  vanishes when the silicon reaches 1.5 per cent. The point  $a_2$  remains clear throughout, but each increase of 1 per cent. of silicon lowers the temperature by about  $11^\circ\text{C}$ . The temperature of  $a_1$  is slightly raised as the proportion of silicon increases, and tends to disappear when the silicon is more than 5 per cent.—Paul Vuillemin: The greening of the wood of the pear-tree. The wood is rendered green by *Helotium aeruginosum* and *H. aeruginascens*, the two species differing in the size of the spores. The name of Chlorosplenium is without systematic value, since several genera have been described under this name which are not closely allied. The colour of the wood is retained indefinitely and has been utilised in the arts.—R. Gateaux: Continued and analytical functionals.—Jules Andraud: The law of similitude of circular springs.—J. Rey: A method of testing optical reflectors. The proposed method, which is applicable to all optical systems giving a real or virtual image of a luminous point placed at its focus, is based on a photograph of the image of square mesh wire gauze. The photograph shows not only that there is an imperfection of the surface, but gives the points of the surface the curvature of which is incorrect. Two reproductions of such photographs accompany the paper.—MM. Massol and Faucon: The absorption of the ultra-violet radiations by some mineral colouring matters in aqueous solution. The various colouring matters studied (potassium ferrocyanide, gold chloride, sulphate of copper, potassium chromate, uranium nitrate, nickel sulphate, chromium sulphate) absorb the ultra-violet radiations unequally. From a quantitative point of view, the absorbing power of synthetic organic colouring matters is much greater than that of the mineral colours.—Daniel Berthelot and Henry Gaudechon: The rôle of uranium salts as photochemical catalysts.

With the exception of uranium salts, none of the fluorescent and radio-active bodies used had any accelerating effect on photochemical reactions. The accelerating effect of uranium salts is limited to a special class of reactions, those which are produced spontaneously in ultra-violet light. The photocatalyst enables the reaction to proceed in ordinary light.—A. **Damiens**: The products of incomplete reduction of cerium oxide. By the action of a limited quantity of carbon on ceric oxide Sterba obtained a substance described by him as cerium oxycarbide. The reduction of ceric oxide is now shown to give a mixture of  $Ce_2O_3$ ,  $CeC_3$ , and  $CeC_2$ ; there is no confirmation of the existence of a definite oxycarbide.—F. **Jadin** and A. **Astruc**: Manganese in drinking water and mineral water. The results of a series of determinations of manganese in the drinking water of eight towns and nine mineral springs. All the latter showed appreciable amounts of manganese varying from 0.09 to 0.20 milligram per litre.—Charles **Nicolle** and E. **Conseil**: An attempt at the experimental reproduction of mumps in the ape.—H. **Pottevin** and H. **Violle**: Experimental cholera in the lower apes.—Jacques **Mawas**: The structure and morphological signification of the comb (*peigne*) of the eye of birds.—M. **Arabu**: The Neogene of the north of the Sea of Marmora.

## GÖTTINGEN.

**Royal Society of Sciences.**—The *Nachrichten* (physico-mathematical series), parts 1 and 2 for 1913, contain the following memoirs communicated to the society:—

December 21, 1912.—F. **Bernstein**: Contributions to mathematical statistics. I., The method of treating incomplete material.—G. **Tamman**: The phase-diagram of water.

January 11, 1913.—A. **Peter**: The diatomaceous flora of southern Hanover, including the Harz, and its distribution in the waters of the region.

January 25.—R. **Wedekind**: Further contributions to the zonal partition of the Upper Devonian.—E. **Perna**: The relations of the Upper Devonian of the Eastern Ural and that of Westphalia and Silesia.

February 8.—G. **Tamman**: The relation of the volume-surface to the polymorphism of water.—B. **Dürken**: The transplantation of young osteoblasts into the orbit of the larval frog.—O. **Wallach**: Researches from the Göttingen University Chemical Laboratory. XXVI., The behaviour of carboxime and of eucarboxime towards free hydrogen in the presence of colloidal palladium.

February 22.—M. **Planck**, P. **Debye**, W. **Nernst**, M. von **Smolukowski**, A. **Sommerfeld**, and H. A. **Lorentz**: Preliminary report on the course of lectures on the kinetic theory of matter instituted by the committee of the Wolfkehl foundation.—P. **Hertz**: The statistical mechanics of the spatial "aggregate," and the probability of a given "complexion" (kinetic theory of gases).—H. **Bolza**, M. **Born**, and Th. von **Kármán**: Molecular streams and discontinuity of temperature.—P. **Koebé**: Boundary adaptation in conformal representation.

March 8.—W. **Voigt**: Electric and magnetic double-refraction.—R. **Trümpler**: Determination of fundamental star-places from altitude-transit observations.

## BOOKS RECEIVED.

The Official Guide to the Norwich Castle Museum. By the late T. Southwell. Fifth edition, by F. Leney. Pp. 182+plates. (London: Jarrold and Sons.)

Brief Sketch of the Natural History Museum of the University of St. Andrews. By Prof. McIntosh. Pp. 63+xvii plates. (St. Andrews.)

NO. 2285, VOL. 91]

Handbuch der vergleichenden Physiologie. Edited by H. Winterstein. 35 Lief. (Jena: G. Fischer.) 5 marks.

A Text-book of Physics. Edited by A. W. Duff. Third edition, revised. Pp. xvi+686. (London: J. and A. Churchill.) 10s. 6d. net.

The Volatile Oils. By E. Gildemeister and F. Hoffmann. Second edition, by E. Gildemeister. Translated by E. Kremers. First volume. Pp. xiii+677+2 maps. (London: Longmans and Co.) 20s. net.

A Systematic Course of Practical Science for Secondary and other Schools. By A. W. Mason. Book II. Experimental Heat. Pp. vii+162. (London: Rivingtons.) 2s. 6d. net.

Jahrbuch der Kaiserlich-Königlichen Geologischen Reichsanstalt. Jahrg. 1913. lxiii. Band, 1 Heft. Pp. 206+vii plates. (Vienna: R. Lechner.)

Light, Radiation, and Illumination. Translated from the German of Paul Högner by J. Eck. Pp. xii+88. (London: The Electrician Printing and Publishing Co., Ltd.) 6s. net.

Brazil in 1912. By J. C. Oakenfull. Pp. viii+498+plates. (London: R. Atkinson.) 5s.

The Place of Climatology in Medicine. By Dr. W. Gordon. Pp. 62. (London: H. K. Lewis.) 3s. 6d. net.

Common British Moths. By A. M. Stewart. Pp. viii+88+15 plates. (London: A. and C. Black.) 1s. 6d. net.

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