sphere, but among these there does not seem to be any relation between the atomic weights and the elevations to which the gases ascend in the chromosphere.

The only non-metals found are H, He, C, and possibly Si.

Of the 225 lines measured in the ultra-violet region of the spectrum only 29 remain unidentified.

The Hydrogen Spectrum.—Twenty-eight hydrogen lines are shown in spectrum No. 3. The wave-lengths obtained are compared in Table III with the theoretical values derived from Balmer's formula. With the exception of Hδ, which seems to be unaccountably displaced towards the red, the wave-lengths of the ultra-violet lines are found to agree closely with the formula. A slight deviation occurs in the most refrangible lines, the positions of which seem to be distinctly more refrangible than those assigned by theory.

The continuous spectrum given by the prominences in the ultra-violet, beginning at the end of the hydrogen series, seems analogous to a feature noticed by Sir William Huggins in the absorption spectra of 1st type stars, and is possibly due to hydrogen.

Hydrogen and Helium in the Lower Chromosphere.—From the character of some of the helium lines it is inferred that this element is probably absent from the lowest strata, whilst parhelium appears to be separated from helium, and to exist at a lower level.

Unlike helium, hydrogen gives very intense lines in the flash layer. These lines are well defined and narrow, even in the very lowest strata.

Reasons are given to show that the absence of hydrogen absorption in the ultra-violet, and of helium absorption in the visible spectrum, may be due to insufficient quantity of these elements above the photosphere, not to equality of temperature between the radiating gas and photospheric background.

The Corona Spectrum.—The wave-length of the green line deduced from measures of No. 3 and No. 7 spectra confirms the value obtained by Sir Norman Lockyer at the same eclipse. The only other lines shown on these photographs are at λ 3388 and near H.

"The Thermo-chemistry of the Alloys of Copper and Zinc." By T. J. Baker, B.Sc., King Edward's School, Birmingham. Communicated by Professor Poynting, F.R.S. Received December 4, 1900.—Read January 17, 1901.

(Abstract.)

The heats of formation of a number of alloys of copper and zinc, containing those metals in very diverse proportions, have been ascertained.

The method consists in finding the difference between the heats of dissolution, in suitable solvents, of an alloy and of an equal weight of a mere mixture containing the metals in the same proportion.

The first series of experiments was made with an aqueous solution of chlorine as solvent. Its application was limited to those alloys containing less than 40 per cent. of copper, as it was impossible to obtain those richer in copper in a sufficiently fine state of division to enable them to dissolve.

The results, though not altogether satisfactory, showed that the heat of dissolution of an alloy was sensibly less than that of the merely mixed metals.

Incidentally it was found that the equation $Cl_2.Aq = 2600$ (Thomsen's 'Thermochemische Untersuchungen') is erroneous and, on inquiry, Professor Thomsen gave a corrected value, 4870. The author finds $Cl_2.Aq = 4970$.

The most suitable solvents of the alloys are—

(*a*.) Mixture of ammonium chloride and ferric chloride solutions.

(*b*.) Mixture of ammonium chloride and cupric chloride solutions.

The chemical actions involved are simple reductions, and no gases are evolved.

Two series of experiments made on twenty-one alloys yielded very concordant results. They show that heat is evolved in the formation of every alloy of copper and zinc yet tested.

A sharply defined maximum heat of formation is found in the alloy containing 32 per cent. of copper, *i.e.*, corresponding to the formula $CuZn_2$. It amounts to 52·5 calories per gramme of alloy or 10,143 calories per gramme-molecule. There is some evidence of a sub-maximum in the alloy nearly corresponding to CuZn.

From these points there is a steady decrease in the heat of formation, both in the case of alloys containing less than 32 per cent. of copper as the amount of copper decreases, and also in the case of those containing more than 50 per cent. of copper as the quantity of copper increases.

The results, in general, confirm the existence of intermetallic compounds, and the values obtained are in accordance with those demanded by Lord Kelvin's calculation of the molecular dimensions of copper and zinc.