uncertain, but where the observations were referred to it was found that "the two spots with the highest relative temperature were very near the sun's edge." He further suggests that if further observation should establish this fact, viz., that spots suffer less absorption than the neighbouring photosphere, we might consider them "to be in a higher stratum than the photosphere."

HYDROGEN SPECTRUM IN THE SOLAR ATMOSPHERE.—M. Deslandres, in the *Comptes Rendus* for July 25, communicates a brief note concerning the spectrum of hydrogen that was photographed by him in a prominence on the 4th of May last. This spectrum, besides containing many metallic lines, shows also ten ultra violet radiations of hydrogen and five other new ones, the latter of which, as he says, follow so regularly the former series that one is led to consider them as due to hydrogen. It may be remembered that Mr. Balmer indicated a simple function of whole numbers which represented exactly the series of 14 radiations of hydrogen. This function, which is applicable to most of the metals, is $N = A - \frac{B}{n^2}$ where N is the number of vibrations, A and B two constants, and n a whole number. In the following table we give the result of M. Deslandres' measures with regard to the new addition to this series, to show how close an agreement exists between the calculated and observed values :—

Whole Nos. of the formula n.	No. of vibrations		
	Deslandres.	Ames.	Calculated.
12 ...	266·565 ...	266·575 ...	266·566
13 ...	296·685 ...	267·715 ...	267·694
14 ...	268·585 ...	268·615 ...	268·586
15 ...	269·310 ...	269·330 ...	269·309
16 ...	269·890 ...	— ...	269·898
17 ...	270·385 ...	— ...	270·387
18 ...	270·795 ...	— ...	270·797
19 ...	271·140 ...	— ...	271·142
20 ...	271·460 ...	— ...	271·448
21 ...	271·700 ...	— ...	271·694

REFRACTION IN MICROMETRIC AND PHOTOGRAPHIC MEASURES.—A very simple method by which the effect of differential refraction may be eliminated from the results of micrometric observations or from the measures of photographic plates is given by Dr. S. C. Chandler in the *Astronomical Journal*, No. 271. The principle underlying this method is the position of the plate about to be measured, which here is inclined at a certain angle in the vertical direction to the focal plane of the telescope. In the measurement of distances this inclination necessitates the application of a small correction, but this is soon accomplished by the aid of a simple formula, which can be considerably modified by determining the screw revolution directly from the plate. One might at first think that by this means the stellar images would be slightly affected, but Dr. Chandler informs us that he thinks that "attentive examination will show that the difference of definition will be inappreciable."

THE RECENT EARTHQUAKES.

THE first of the earthquake shocks felt on the 18th inst. in Ireland, Wales, and the West of England was evidently one of unusual strength for this country, and it is very desirable that both it and the subsequent slighter shocks should be thoroughly investigated, with a view to discovering their origin and their relations to one another. As I have been engaged for several years in working at our British earthquakes, and am now occupied in studying these recent shocks, I should be greatly obliged if you would allow me to ask your readers who felt the shocks for assistance in obtaining the necessary materials.

It would be of great service to know simply the names of as many places as possible where one or more of the shocks were felt and the accompanying sounds heard. With this knowledge the boundaries of the disturbed area and the sound-area of each shock may be determined—points of considerable importance. But for a complete study of the shock it is desirable to have further details, such as would be given by answers to the questions printed below, especially to those numbered 3, 4, 6, and 7. I shall be most glad and thankful to receive accounts of the earthquakes from any place whatever, and I may add that no account, however scanty the information given, can fail to possess some value or to help in throwing light on the nature and origin of the shock.

(NOTE.—If more than one shock was felt it is important that the notes relating to each should be kept separate.)

(1) Name of place where the shock was felt.

(2) Situation of the observer: (*a*) Whether indoors (and on which floor of the house) or in open air: (*b*) How occupied at the moment of the shock.

(3) Time at which the shock was felt, if possible, to the nearest minute.

(4) Nature of the shock, description of the: (*a*) The number of vibrations: (*b*) Their relative intensity: (*c*) Whether there was any tremulous motion before or after the principal vibrations: (*d*) Whether any vertical motion was perceptible, and if so, whether the movement was first upward and then downward, or first downward and then upward.

(5) Duration of the shock in seconds, not including that of the accompanying sound.

(6) Intensity of shock: Was it strong enough (*a*) to make windows, doors, fire-irons, &c., rattle: (*b*) To cause the chair or bed on which the observer was resting to be perceptibly raised or moved: (*c*) To make chandeliers, pictures, &c., swing, or to stop clocks: (*d*) To overthrow ornaments, vases, &c., or cause plaster to fall from the ceiling: (*e*) To throw down chimneys, or make cracks in the walls of buildings?

(7) Sound-phenomena: (*a*) If any unusual rumbling sound was heard at the time of the shock, what did it resemble? (*b*) Did the beginning of the sound precede, coincide with, or follow, the beginning of the shock, and by how many seconds? (*c*) Did the end of the sound precede, coincide with, or follow, the end of the shock, and by how many seconds? (*d*) Did the sound become gradually louder and then die away? (*e*) Were the principal vibrations felt before, at, or after the instant when the sound was loudest?

(8) The names of any other places where the earthquake was noticed would be most useful, together with answers for each place (if possible) to the following questions:—(*a*) Was the shock felt? (*b*) Was it strong enough to make doors, windows, fire-irons, &c., rattle? (*c*) Was any unusual rumbling sound heard at the time of the shock?

CHARLES DAVISON.

38, Charlotte Road, Birmingham, August 23.

CHEMISTRY AT THE BRITISH ASSOCIATION.

AFTER the President's address, the first paper was read by Prof. Crum Brown on "Electrolytic Synthesis," descriptive of work carried out in conjunction with Dr. J. Walker.

He showed how, by an extension of the electrolytic methods which had been already fully worked out in relation to potassium acetate, the higher fatty acids of other series could be synthesised. Thus, starting from the ethyl potassium malonate the ether of succinic acid was obtained in considerable quantity and with great readiness. Similarly adipic, sebacic and other ethers had been obtained. Secondary products were formed which in the higher members of the series accumulated in inconveniently large quantities.

Professor Ramsay gave a communication on the "Impurities in Chloroform." He found that when the purest chloroform that could be prepared was exposed to light between the months of March and July, it emitted an acrid odour when opened, due to the formation of phosgene gas. The reaction by which this had been brought about was :—

$$2CHCl_3 + O_2 = 2\,COCl_2 + 2\,HCl.$$

The second day of the meeting was devoted almost entirely to the consideration of the phenomena accompanying the combustion of gases. Messrs. Lean and Bone gave an account of the results obtained in exploding ethylene with less than its own volume of oxygen. They had found that there was always a considerable rise of pressure, and that the resulting products contained, in addition to hydrogen and carbon monoxide, small percentages of carbon dioxide, unsaturated hydrocarbons, and some saturated hydrocarbon, presumably marsh gas.

The unsaturated hydrocarbons consisted largely, if not entirely, of acetylene. Carbon is also formed as a product of the reaction, due in all probability to the decomposition of heavy hydrocarbons into marsh gas and carbon at high temperatures. The experiments show that oxygen combines with carbon in preference to hydrogen.

Prof. Lewes, in his paper on the "Luminosity of Hydro-