experimentally very difficult, owing to the circumstances that the source of the positive rays is never reproducible and seldom constant for more than a very short time and also that the relation between relative abundance of isotopes and blackening of the plate is completely different for different elements. Dr. Aston described the experimental procedure adopted in overcoming these difficulties. The results, based on $O^{16} = 16$, require correction by 2 in 10,000 to reduce them to the chemical scale, O = 16, since ordinary oxygen contains the isotopes O^{17} and O^{18}, and a comparison of the two sets of values shows that the agreement is in the great majority of cases exceedingly satisfactory. There is a discrepancy in the case of hydrogen, which cannot be removed by the recent discovery of an isotope of mass number 2, which is present only to the extent of 1 part in 35,000. Scandium, niobium and tantalum, which are simple elements, show discrepancies, their chemical atomic weights being too high, and the same is true, to a less degree, of phosphorus and cæsium. The serious difference in the case of selenium has been removed by Hönigschmid, whose chemical value is identical with the physical one. The physical value for tellurium, which differed from the chemical one, has been corrected by Bainbridge, whose result agrees with the chemical one. The values for osmium and uranium are also abnormal.

Simple Molecules and Elementary Processes. Two lectures by Prof. A. J. Allmand on the above subject have been published by the Institute of Chemistry, and form a very clear and concise introduction to a field of research which has recently been actively studied. In the first lecture the experiments of Stern and his collaborators on molecular rays are briefly considered, and then an account is given of molecular spectra, the text here being illustrated by several useful diagrams. The parts played by the electronic, vibrational and rotational energies of the molecule in producing the spectra are clearly explained, and the importance of Raman spectra in deciding the natural frequency is emphasised. The second lecture dealt with a miscellaneous group of phenomena giving information about the mechanism of individual chemical molecular processes. The evidence for the existence of free radicals such as OH, NH, CH, etc., from spectroscopic results is considered in connexion with the energy of linkage. The chemical reactions of atomic hydrogen and atomic oxygen, the chemical evidence for the existence of free radicals given in the experiments of Paneth and F. O. Rice, chain reactions, predissociation, and three body collisions are topics dealt with in this lecture. Prof. Allmand's lectures will be found to constitute an admirable introductory survey of a highly interesting field of modern physical chemistry.

Astronomical Topics

Comet Peltier-Whipple. This was probably the brightest of the numerous comets that were observed in 1932. It was on the verge of naked-eye visibility at the end of August. *Astr. Nach.*, 5905, contains observations of it made by R. M. Aller of Lalin Observatory on twelve nights between August 25 and September 19; also drawings of the comet on August 27, 28, September 2 and 7. The tail is multiple; the main branch is triple and was traced to the length of a degree on August 28. Its position angle changed from about 300° on August 27 to about 330° on September 7. A short, but bright, tail was inclined at about 45° to the main tail, on the side of greater angle. The sketches show a coma about 3′ in diameter round the nucleus.

Mr. H. Jensen of Copenhagen finds 287·2 years as the period, and Mr. F. Koebcke of Poznan 286·8 years (Copenhagen Circulars 403, 404). Search in the catalogues does not show any previous apparition of the comet.

A determination of the light-curve of the comet has been published by K. Himpel (*Astr. Nach.*, 5913). It was of magnitude 6·7 on August 12, and slowly rose to a maximum of 6·3 on August 24: it then declined rapidly, being 7·7 on September 9. A very thorough investigation of its orbit, by Dr. Allan D. Maxwell (Publ. Univ. Michigan, vol. 5, No. 2) gives the period as 302·5 years. Comparison with other determinations suggests that this is unlikely to be more than some ten years in error.

Galactic Rotation. *Lick Observatory Bulletin* No. 448 contains an investigation on this subject by Miss Phyllis Hayford. It is necessary for this purpose to observe the radial velocities of distant objects. This investigation made use of a large number of spectrograms of stars in the Milky Way clusters, obtained with the 36-inch refractor; Dr. Trumpler took many of the plates, but all were measured by Miss Hayford. The clusters are all within 10° of the galactic plane, and are distributed fairly uniformly from galactic longitude 311° through 0° to 206°. 116 of the stars are of type *O*5 to *B*5, 32 of type *B*6 to *A*2, and 13 of later type. Their magnitudes range from 5·3 to 12·2; their adopted distances range from 940 to 3,680 parsecs.

As is to be expected, the solar motion relatively to these distant stars is higher than that derived from neighbouring stars; it is about 30 km./sec. The longitude of the galactic centre, 333°, agrees well with other determinations. The investigation confirmed the result of Dr. Plaskett and others that the interstellar calcium lines indicate a smaller distance than that of the stars in the spectra of which they are measured.

The distance of the galactic centre is found to be of the order of 1,800 parsecs from the sun, a much smaller distance than that found by Dr. Oort, which was about 6,000 parsecs. But the new distance, being derived from a limited number of objects, does not claim to be final.

Mutual Eclipses and Occultations of Jupiter's Satellites. Every six years the system of Jupiter is turned edgewise to us; at such times, numerous eclipses and occultations of one satellite by another take place. Until recently these phenomena were unpredicted, and in consequence they were very seldom observed. The Computing Section of the British Astronomical Association now makes predictions which are published in the B.A.A. Handbook; very many have been observed during the past twelve months. *L'Astronomie* for September contains an illustrated account of the occultation of IV by I observed by M. Schlumberger at Mulhouse on March 14, 1932; the occultation was very nearly total. The surface of IV is so much darker than that of I that it is easy to distinguish the two bodies when the discs are overlapping; at the maximum phase a very narrow segment of IV remains uncovered.