with valences greater than two and one respectively. These cases would be disposed of by London, perhaps, as not being all 'homopolar' in type. Nitrogen, however, according to London, should have but three electrons to share, and nitric acid and the amine oxides appear to offer difficulties.

By giving up the rule of eight a few facts can be accounted for on grounds more definite than those of energy relations. But it may be expected that when a rule which has been found applicable to hundreds of thousands of compounds is given up, new explanations must be invented for the existence or non-existence of various chemical structures, and some of these explanations will probably involve *ad hoc* assumptions.

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The Raman Effect and the Spectrum of the Zodiacal Light.

IN a recent address (*Indian Journal of Physics*, vol. 2, part 3, p. 387) Prof. C. V. Raman announced the interesting discovery that when monochromatic light is diffused by the molecules of a liquid, the spectrum of the scattered light contains, besides the incident lines, also other new lines of increased wave-length. The Raman effect, as it may be called, is less easily observed in the case of scattering by gases and vapours. Nevertheless, I have succeeded in photographing a satisfactory spectrum of the light scattered by the vapour of ether showing the effect. For this purpose, a specially constructed spectrograph of small dispersion and very large light-gathering power was used. With a 3000 c.p. mercury vapour lamp as the source, an exposure of 186 hours on the light scattered by a flask of ether vapour brought out the most prominent line of increased wave-length very clearly. The intensity of this line in relation to the incident line which excites it is considerably less in the case of the vapour than in the case of the liquid.

The spectrograph constructed for the research mentioned above proved itself equal to the task of photographing the spectrum of the zodiacal light with less than an hour's exposure, fast plates sensitised with erythrosine being used. The plate showed a continuous spectrum, with the calcium absorption line at 4227 A. prominently appearing in it. The spectrum showed no trace of light of wave-lengths longer than about 5000 A., though the plates were sensitive up to the *D* lines. The complete absence of the longer wave-lengths makes it difficult to accept the suggestion of Dufay that the particles to which the zodiacal light is due are larger than the wave-length of light in size. It is more reasonable to assume that the scattering material is diffused in atomic or molecular condition. Since the radiation incident on the diffusing molecules includes very short wave-lengths, the scattered radiation from them penetrating through the earth's atmosphere must include not only the incident frequencies, but also radiations of modified frequencies which are less perfectly polarised. The weakness of polarisation of the zodiacal light can be reasonably accounted for in this way. It appears not improbable, therefore, that the Raman effect is of significance in relation to the spectral character and polarisation of the zodiacal light.

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Imperishable Labels for Preserved Organisms.

WHEN paper labels are used for describing the contents of a bottle containing animals, especially those obtained on expeditions and not examined until many years after the material is preserved, it is not infrequently difficult to read the labels with certainty. Valuable material is sometimes lost from this cause. Moreover, the writing of paper labels out-of-doors in wet weather under pressure of time and material is irksome and inefficient. No doubt there are many ways of overcoming a minor difficulty of this kind, but it is probably not superfluous to record a successful method which may not be known generally and has been extended in this laboratory to more valuable uses. A satisfactory label can be made of pieces of opal glass of a suitable size and thickness. Opal glass sheets or slips can be obtained easily commercially with one side polished and the other rough and unpolished. There is no difficulty in writing with a graphite pencil on the unpolished surface, and the writing is permanent in ordinary preservatives and fixatives.

In overlooking recently a quantity of labels I made in this way in 1912 and 1913, I find they are as clear to-day as when written. I have also used labels of this kind during many years for experiments in the sea, but growths may render them undecipherable after about a year's immersion. No doubt other workers have used similar labels, but if so, the fact merely serves to show that convergence is common in the realm of ideas as it is in organic evolution.

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The Reflecting Power and Colour Sequences shown by Metals on Activation.

THE brightening of the colour sequences shown by copper on continued oxidation and reduction has been observed to occur simultaneously with the increase in catalytic activity (cf. Hinshelwood, *Proc. Roy. Soc.*, A, vol. 102, p. 318; 1923). Direct spectrophotometric observations have shown (*Proc. Roy. Soc.*, A. vol. 117, p. 377; 1928) that the reflecting power of the metals, iron, nickel, and copper reduced from the granular oxide increases with the number of oxidations and reductions until a limiting reflecting power is reached, and that the brightening of the colour sequence is a consequence of the increased reflecting power of the underlying metal. The limiting reflecting power of activated reduced nickel and copper is, however, much less than that of the burnished metals. Thus a burnished metal surface becomes duller on activation, and the accompanying colour phenomena are less pronounced. This has now been verified experimentally.

It is usual for a metal to produce colour sequences on oxidation which increase in brightness on alternate oxidation and reduction, because the original metallic surface reduced from the coarsely granular oxide becomes finer in structure, but this brightening is not always associated with activation.

A burnished surface becomes duller and coarser on alternate oxidation and reduction, and the associated colour sequences become less bright.

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