Free Radical Terminology

SOME confusion appears to be creeping into the literature with regard to the designation of molecules which function as free radicals. Some authors, for example, describe methylene $\text{H}_2\text{C}=\text{}$ as a diradical, and the next step presumably will be to term methine $\text{HC}\equiv\text{}$ a triradical. This is certain to lead to confusion, since methylene contains a carbon atom with an electron sextet, while a diradical, such as $-\text{CR}_2-\text{CR}_2-\text{CR}_2-$, contains two carbon atoms with an electron septet or free valence. Accordingly, methylene with its electron sextet should be regarded as a bivalent radical. It is true that oxygen, in virtue of its high paramagnetism, is considered to be a diradical, but this refers to the oxygen molecule, $-\text{O}-\text{O}-$, with each atom carrying a free valence.

The terms 'odd molecule' and 'even molecule' have now lost much of their original significance, since we

are now familiar with even-numbered diradicals and also with charged molecules containing an unpaired electron. Thus the molecule

is an even molecule since it contains an even number of electrons. In view of the fact that it is both an ion and a free radical, it is conveniently termed an 'ion-radical'. This serves to avoid confusion with the terms 'radical ion' and 'ionized radical', which have long been in use to designate the triarylmethyl ions, R_3C^+ and R_3C^- , and inorganic ions, such as NH_4^+ and ClO_4^- .

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Points from Foregoing Letters

A TABLE showing the amount of phosphate which enters into combination, in presence of oxygen, when glucose or malate is added to minced kidney cortex of a fasting rabbit, is given by Dr. H. Kalekar. The author concludes that malic acid is oxidized to pyruvic acid which combines with phosphate to form phosphopyruvic acid, as an intermediate step in the synthesis of sugars.

Experiments with 'labelled' radioactive phosphate injected into the blood stream show, according to A. H. W. Aten, jun., and Prof. G. Hevesy, that there is a rapid exchange of phosphorus atoms between plasma and cells, that is, between inorganic phosphate and the phosphoric ester in the red blood corpuscles. Hexosemonophosphate penetrates the cells less rapidly but is decomposed within an hour in the blood stream by an enzyme derived from the bones.

F. C. Pybus and Miss E. W. Miller report that oestrone tablets, weighing 5 mgm. each, were implanted subcutaneously into young male mice belonging to a strain in which 77.3 per cent of the females and 29.6 per cent of the males develop bone tumours. Three of these mice have developed osteomata at the age of 3-3.5 months, 2.5 months after the tablets were implanted; the bones of two others showed definite early changes. The average tumour age in males is 17.7 months, and the earliest tumour in an untreated male appeared at the age of six months.

A. M. Kotljär and V. Podroužek submit 'polarographic curves' indicating that the method can be conveniently used to detect the products of protein break-up, such as are formed when normal serum is added to fibrin from a cancer patient, or vice versa.

By exposing thorium nitrate to fast neutrons, obtained by bombarding lithium with 3 Mv. deuterons, Dr. Y. Nishinà, T. Yasaki, Prof. K. Kimura and M. Ikawa have produced a radioactive substance with half-period and beta-ray penetrating power identical with those of uranium Y, parent of the protactinium series.

The magnetization curve of superconducting Au_2Bi has been measured by Dr. D. Shoenberg, and it is found to resemble that of an 'ideal' superconducting element rather than that of a typical alloy. Since Au_2Bi , unlike most superconducting alloys, has the same

composition and structure throughout its volume, it is inferred that the anomalous properties of most superconducting alloys are connected with inhomogeneity rather than with the fact that they are alloys.

The relationship between the diameter of iron wire and the maximum slope and the initial slope respectively, of the magnetization curves after the wires had been heated to a condition of maximum permeability have been obtained by Dr. T. F. Wall. The results obtained imply that the process of magnetization commences at the surface and proceeds progressively towards the axis.

Out of 59 major earthquakes during the last 300 years, eighty per cent occurred at the time of new or full moon. C. D. Perrine considers this as evidence in favour of the view that the time when ruptures due to earthquake stresses about geological faults take place is determined by the gravitational action of the sun and moon, the tidal action of which brings about the rupture by releasing the pressure.

L. C. Comrie finds in the thelytokously parthenogenetic saw-fly, *Pristiphora pallipes* Lep., that the diploid number in the female is 16, that in the rare male 8. In oogenesis there occur two maturation divisions, reduction, and the subsequent juxtaposing of pronucleus and second polar nucleus, which usually indicates that diploidy is restored by fusion of these nuclei. Two sexual abnormalities have been found. In the species *Priophorus tener* Zad., both arrhenotokous and thelytokous parthenogenesis have been discovered; the female and male counts are 12 and 6 respectively.

Prof. F. E. Fritsch and P. K. De report that pure cultures of the Blue-green Alga *Anabaena* found in Indian rice fields, has been shown to have the property of fixing nitrogen from the air, and they claim that this is the first conclusive proof of the ability of a Blue-green Alga to do so.

Dr. S. T. Bowden directs attention to the confusion which is prevalent concerning odd and even molecules, and the application of the terms radical and diradical. He suggests that a molecule carrying both a charge and a free valence be called an ion-radical in order to distinguish it from the ionized radical and radical ion.