

SECTION V.—A conditioned reflex method of testing the "time-sense" of animals has been evolved, and the results of a preliminary investigation on cats are given.

APPENDIX.—An improvement has been introduced into the "tube-coupled" circuit of E. R. Meissner. According to the theoretical analysis given, the voltage gain per stage may by it be increased by nearly 50 per cent. With one stage of amplification, measured D.C. voltage gains of over 3000 have been realized.

PH. D.

PHYSICS

WILLIAM BRUCE ROSS

INVESTIGATIONS ON THE KENNELLY-HEAVISIDE
AND APPLETON LAYERS.

Radio ionosphere investigations in connection with the International Polar Year, carried out in Montreal between January and August, 1933, using the amplitude variation method of Breit and Tuve, are described. Especial attention is paid to the variation of equivalent layer height with frequency, and a statistical analysis of the records is carried out. This clearly shows the presence of an intermediate reflecting layer and of "midnight E". The phenomenon of "persistent E" reflections is described and a number of typical curves are discussed. Comparison of the results with solar and meteorological records fails to show any correlation. Marked scattering in the values for maximum layer ionization is taken to be an indication of unstable conditions which permit the frequent occurrence of the above anomalous effects.

PH. D.

CHEMISTRY

J. K. RUSSELL

A STUDY OF THE NATURE OF VAPOUR SORPTION ON CELLULOSE.

The following measurements have been performed (1) the sorption of water vapor on beaten and unbeaten wood pulps. (2) The sorption of water on wood pulps which had been heated. (3) The sorption of methyl alcohol vapour on groundwood, unbleached kraft and bleached sulphite pulps. (4) The sorption of n-propyl alcohol vapour on bleached sulphite pulp and purified cotton both with and without preliminary washing of the samples with propyl alcohol. From the results of these measurements it has been concluded (1) That no chemical change takes place on the beating of pulps. (2) That the predominant factor governing the sorption of vapours on cellulose is the available volume within the cellulose structure and that this volume is governed by the internal tension of the sorbed liquid. (3) That adhesion between and within the fibres is a modifying factor in the available volume in the cellulose.

PH. D.

CHEMISTRY

H. R. SALLANS

1,5-DIKETONES: CYCLIC COMPOUNDS CONTAINING A CARBONYL GROUP;
A MECHANISM FOR THE FORMATION OF PIRYLUM SALTS.

Under the influence of alkali cyclic ketones of the cyclopentanone and cyclohexanone series add to chalcones forming semicyclic 1,5-diketones. Menthone an exception forms a bicyclic keto-alcohol containing a carbonyl bridge; the diketones may be dehydrated yielding closed ring structures and forming substances containing a similar bridge. The bridge in these compounds is not removed by heating. This behaviour is in marked contrast with that of similar ring systems produced by the Diels and Alder synthesis.

A second mode of ring closure results in the formation of perylum salts. Isolation of an oxygen heterocyclic methyl ether affords an intermediate step in the cyclicization, and has made it possible to formulate a plausible mechanism for this hitherto obscure reaction. Four varieties of salts are described, perchlorates, iron and antimony double salts of perylum chlorides, and tin double salts of perylum acetates.

PH. D.

CHEMISTRY

JAMES ALEXANDER SCARROW

ADDITION REACTIONS OF α -METHOXYBENZALACETOPHENONE.

Cyanoacetamide has been added to α -methoxybenzalacetophenone, with the production of a highly substituted piperidine. This, by the action of different reagents, has been converted into a number of pyridines and hydroxyridines.