

HERBERT ARTHUR REEVE

A COMPARISON OF THE KINETICS OF HOMOGENEOUS
AND HETEROGENEOUS GAS REACTIONS.

The kinetics of the thermal decomposition of gaseous dimethyl ether on the surface of platinum has been investigated. The decomposition is unimolecular, and the heat of activation is found to be 67,000 calories as compared with 58,500 for the homogeneous reaction.

The kinetics of a number of unimolecular decomposition reactions, which have been investigated both homogeneously and heterogeneously, have been compared. An examination of the molecular statistics of the filament reactions shows that they invariably take place in the gas layer surrounding the filament, and are not catalysed. In the case of ethyl ether and of acetone the gas layer is in thermal equilibrium with the filament, and the apparent heat of activation agrees with that of the homogeneous reaction.

With propionaldehyde and with methyl ether the apparent heat of activation is much *higher* than that of the homogeneous reaction. These reactions also take place in the layer of gas surrounding the filament. The high temperature coefficients of these reactions can be explained on the assumption that the accommodation coefficients for these gases are low, and hence thermal equilibrium with the filament is not attained by colliding gas molecules.

R. RICHARDSON

THE SORPTION OF SODIUM HYDROXIDE FROM LIQUID PHASES
BY VARIOUS CELLULOSES; AND RELATED RESEARCHES.

The sorption of aqueous sodium hydroxide by white spruce (*picea alba*) has been determined and a novel titration procedure developed. The sorption work was extended to various components, even to non-electrolytes, and to complex systems. A new method for the calculation of sorption results in systems of more than two liquid phase components has been devised and demonstrated. The natural rates of penetration into spruce of water and several electrolytes have been investigated, a theoretic formula for the time to one half diffusion developed, the shapes of chips most resistant to diffusion calculated, and fibre length studies instituted. An apparatus for the measurement of coefficients of expansion (swelling) of wood as a function of humidity or solutions has been set up and the axial humidity swelling of spruce denoted. A machine for the measurement of "absolute" paper opacity as a wave length function by a balanced dynamic photoelectric method has been constructed.

ARTHUR HAWLEY SNELL

THE STARK EFFECT IN THE MOLECULAR SPECTRUM OF HYDROGEN.

Stark Effect has been observed in the secondary spectrum of hydrogen between the wavelength limits 4861 Å and 6500 Å. Measurements have been obtained for the displacements of 136 lines at field strengths of over 90,000 volts per cm. These include 53 lines of the $H\alpha$ bands. A 28-foot grating was used in the analysis, the dispersion being 3.80 Å per mm. The effect manifests itself chiefly as simple, small displacements of the lines. Splitting into two components sometimes occurs, but more complicated patterns are rare. The effect is on the whole very irregular. However, it is found that the lines of the $H\alpha$ bands are nearly all displaced toward the red, and the lines of the ($3p^3\Delta - 2p^3\pi$) bands are nearly all displaced slightly toward the blue. Comparison with theory is at present impossible, due to lack of information about the normal $H\alpha$ spectrum.

EDGAR WILLIAM SPANAGEL
ANHYDROACETONEBENZIL.

The presence of a tertiary hydroxyl group in anhydroacetonebenzil has been shown by the production of a chloride with acetyl, thionyl, phosphoryl, and anhydrous aluminum chloride. Further the structure of an isomeric chloride prepared by Japp has been ascertained. An analogous series of reactions with β , β -imethylanhydroacetonebenzil was also carried out.

The bimolecular product that results from the dehydration of anhydroacetonebenzil is a tricyclic substance, having a carbonyl bridge in a six-membered ring. The structure was established as 2, 4, 7, 7a-tetrahydro-3, 3a, 5, 6-tetraphenyl 1-4, 7-methanoidene-1, 8-di-one, by a long series of degradation reactions terminating in o-diphenylbenzene. In the proof of the structure of this substance it was found that