

Promoter Concentration and Catalysis

IN a recent publication¹ attention has been directed to the critical concentration of silica required to give the maximum increase in the activity of molybdenum oxide catalysts used in the decomposition of hexane at 500°. A survey has now been made of the concentration required with a wide range of other promoters, and it is found that in the case of oxides of sodium, chromium, cerium, aluminium, barium, boron and thorium, the ratio of the number of atoms of these elements to 100 atoms of molybdenum is the same as that previously observed with silicon.

When, however, the promoter is an easily reducible oxide such as that of lead, iron or copper, the promoter concentration required is only half that which is necessary in the above case.

Again, using molybdenum oxide as a catalyst for the conversion of phenol to benzene by hydrogenation at 450° at atmospheric pressure, the optimum concentration is found to be much higher than for the previous reaction, but again is practically identical in the cases of silica and alumina respectively. The active oxide of molybdenum may, however, be quite different under the alternative conditions of experiment.

These observations appear to be of interest with relation to the nature of promoter action, and it is intended to discuss them fully at an early date.

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¹ Griffith and Hill, *Proc. Roy. Soc., A*, 148, 193 (1935).

Points from Foregoing Letters

THE efficiency of several promoters in increasing the catalytic activity of molybdenum oxide (used in the hydrogenation of phenol to benzene) is given by F. E. T. Kingman and Prof. Eric K. Rideal. The presence of phosphorus, nickel, chromium or silicon compounds enhances the activity, whilst tin and thorium compounds depress it. The authors state that they have also determined the surface area of the catalysts investigated.

A survey of the concentration of promoters leading to maximum catalytic activity of molybdenum oxide shows, according to Dr. R. H. Griffith, that there is a constant optimum molecular ratio for silicon, sodium, copper, chromium, cerium, aluminium, barium, boron and thorium; with lead, iron and copper a molecular concentration only half as great is needed.

Graphs showing a close correlation between the death rate of infants and that of mothers in depressed areas, when charted in successive years instead of the same year, are submitted by Lady Williams. The author ascribes this correlation to the effect of malnutrition expressing itself first in the infants, owing to the insufficient nourishment of nursing mothers, and afterwards its effect on the mothers themselves becomes apparent.

A generalised expression, from which the known relationship between the velocity and the equilibrium constants of certain related chemical reactions can be deduced as specialised cases, is derived by M. G. Evans and Prof. M. Polanyi from thermodynamic principles.

From an investigation of the Zeeman effect of the hyperfine structure lines of the mercury resonance line 2537 Å., Dr. A. Žvironas concludes that the experimental results are in good accordance with the theoretical values.

With new equipment for vacuum spark spectroscopy, giving essentially improved conditions for the study of spectra of very high ionisation, Prof. B. Edlén has photographed the spectra of the elements titanium to zinc in the region 30–200 Å. Preliminary analyses have resulted in tracing the Na I - like isoelectronic sequence through the whole series of elements including copper, Cu XIX.

Mr. R. A. Stephen and Dr. R. J. Barnes state that the method used in their technique for obtaining X-ray powder patterns from flat polycrystalline specimens, and for obtaining an intense, mono-

chromatic, polarised X-ray beam from a single crystal is simply an application of the principle of 'fore-shortening'.

A new counter for alpha-particles consisting of a very thin leaflet of aluminium or platinum, attracted to an insulated point conductor kept at a potential of + 2,500 volts, is described by S. S. Wassiliew. When an alpha-particle falls within the region of the point, a discharge occurs and the leaflet flies back from the point.

Graphs showing the speeds of propagation of flames in carbon monoxide - oxygen mixtures of various concentrations, and at different pressures, are given by V. Voronkov and A. Sokolik. They consider that the form of the graphs is connected not with hygroscopic conditions but with a change in the temperature of spontaneous combustion for constant time lag.

J. Bell finds that copper sulphate solutions in heavy water are lighter in colour than solutions of equal concentration in ordinary water, and a slight difference in tint is apparent. This difference is also found in the solid salts $\text{CuSO}_4 \cdot 5\text{D}_2\text{O}$ and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.

N. L. Pal and U. N. Chatterji state that they found an increased rate of respiration on injection of insulin in leaves of *Hiptage madablota* and *Allium tuberosum*, but a decrease in respiration in the flattened stems (phylloclades) of *Opuntia Dillenii*.

An account is given by Dr. B. J. Grieve of leaf movement and adventitious root formation in tomato and other plants due to invasion by the vascular parasite *B. solanacearum*. Although a substance has been obtained from the bacteria which causes bending in oat coleoptiles and initiates strong root development in tomato, Dr. Grieve considers that other factors, such as partial blockage of vessels, are also involved.

Prof. V. Ambarzumian states that the observational data of double-star astronomy are definitely against the 'long time-scale' of the universe (10^{13} years). Sir James Jeans disagrees, claiming that the data are only opposed to an infinitely long time-scale.

Prof. K. Aston describes an investigation undertaken to determine losses in electrical machinery due to open slots. The method consists in the measurement of the torque on the stator of a homopolar machine under various conditions of flux density, speed and slot proportions.