

Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 538.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Effect of Promoters on Molybdenum Catalysts in Hydrogenation

EXAMINATION of the molybdenum sulphide catalysts used for hydrogenation has shown that they are not completely resistant to the effect of heat treatment; X-ray diagrams taken before and after several hours' heating show that the heating results in an increase in the particle size of the catalyst, with a consequent decrease in the surface area and loss of catalytic activity.

Attempts have been made to eliminate this sintering by the addition of promoters, and experiments have led to a general investigation into the effect of promoters on molybdenum compounds used as hydrogenation catalysts. In the course of this investigation, it has been found that a particularly effective method of introducing the promoters is to prepare the catalyst from the appropriate heteropoly acid with the promoter as the central atom in the complex¹.

These heteropoly acids and their salts can be divided into two groups², with twelve and six molybdenum atoms respectively grouped about the central atom, and represented by the general formulæ:

- (a) $R_n [X. (Mo_2O_7)_6]$ $X = P, Si, As, Th, Sn, etc.$
 (b) $R_n [M. (MoO_4)_6]$ $M = Cr, Ni, Co, Cu, etc.$
 $R = H, NH_4, K, etc.$

The ammonium salts of the acids were used, and the catalysts heated in hydrogen for six hours at 480° C. Thus each catalyst was subjected to identical heat treatment before determination of its surface area and catalytic activity were made, and furthermore, catalysts with high initial but transient activities were deactivated.

The efficiencies of the catalysts were tested by measuring their activity in the catalytic hydrogenation of phenol at atmospheric pressure, determinations being made over a range of temperatures so as to enable calculations of the heats of activation to be made. In the brief summary given below, results for experiments carried out at 350° C. only are given. The rate of passage of phenol (in grams phenol per gram catalyst per hour) was 0.8 gm. in the first series, and 0.45 gm. in the second.

Catalyst	Promoter	Activity (per cent conversion of phenol)
First series		
Mo oxide	Unpromoted	24.0
" "	Th	18.3
" "	Sn	14.1
" "	Si	78.5
Mo oxide } V oxide }	P	51.9
Second series		
Mo oxide	Unpromoted	28.3
" "	Ni	83
" "	Cr	c. 80
" "	P	97.7
" "	Supported on alumina gel	41.5

The mixed oxide catalyst in the first series was prepared from a mixed complex heteropoly acid of vanadium and molybdenum², with phosphorus as the central atom. The unpromoted molybdenum oxide was prepared from ammonium molybdate.

The promoters given above fall distinctly into two classes: the first containing P, Ni, Cr, and Si, which result in a marked enhancement of the catalytic activity of the molybdenum oxide catalyst, and the second, Sn and Th, which have an equally well-marked depressing action on the activity.

Fuller details of these experiments, together with results of attempts made to elucidate the nature of the promoter, will be published later.

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¹ See also Brit. Pat., 371, 833.
² Abegg Auerbach, "Handbuch der Anorganischen Chemie", vol. 4, part 1, 2nd half, p. 977.

Infantile and Maternal Mortality in Relation to Nutrition

IN the course of investigations into the maternal and infantile death rates of different areas, carried out in connexion with the work of the Joint Council of Midwifery, it has been discovered that a hitherto unsuspected correlation between these two rates exists if they are charted in successive years instead of in the same year, the infantile rates being shown for the year preceding the maternal. It has also appeared that this correlation, which is very marked in distressed areas, and especially during years of industrial depression, is lessened and even reversed in prosperous districts and in good years. The average level of both rates is also much higher in districts in which unemployment is severe than in other areas. The maternal death rate of the five principal coal-mining counties, for example, for the years 1928-34 is 41.05 per cent higher than that prevailing in Middlesex and Essex, and for the years 1927-33 the infantile death rate is 50.98 per cent above.

That nutrition rather than other environmental factors underlies these figures is suggested by the fact that the correlation between the two rates appears in successive, and not in the same year. Climatic, epidemic and other similar influences have their effect on both death rates in the year in which they occur, and should tend to produce a correlation between the two rates in the same year. Good or bad nutrition, however, extends its effects over a period, and it seems natural to suppose that the infantile death rate should be the first to show the effects of malnutrition, owing to the adverse influence