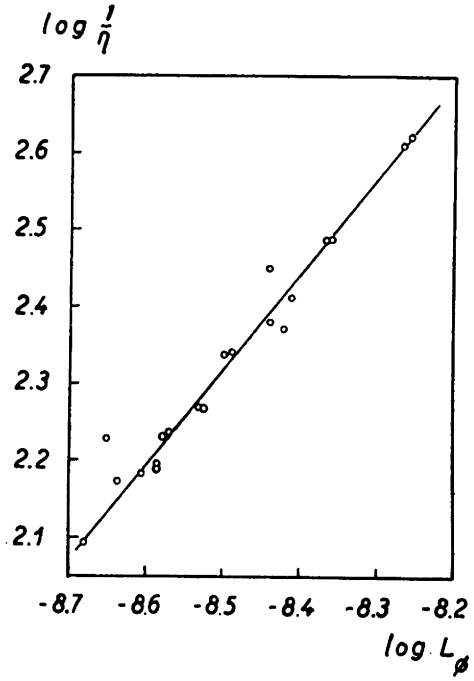

Fig. 2. Fluidities ($1/\eta$) plotted as a function of intermolecular free fluidity lengths ($L\Phi$) of 20 non-associated liquids at 20° C.

viscosity values given in the literature and from (2) by utilizing zero fluidity volumes according to Friend [2] for 20 non-associated liquids. The mean deviation in $L\Phi$ in this case is 4.3 %. Fig. 2 shows in logaritmic scale the fluidities for these 20 liquids as a function of $L\Phi$ according to (2). The largest deviation is observed with toluene (to the lower left in the figure). With a recalculated value of Friend's V_0 better agreement is obtained.

Owing to their simplicity these relations should be of value in the study of associated liquids. In order to arrive at the degree of association in a liquid there is first determined L or $L\Phi$ according to (1) from the values of compressibility or surface tension or viscosity. Then there can be determined from equ. (2) the number of monomers which are forming the associated complexes. For the lower fatty acids agreeing values are obtained for degrees of association computed from compressibility, surface tension and viscosity. They amount to about 2 and thus agree with the values obtainded by other methods.

Full data regarding these and for the constants k and p for the different properties at different temperatures will be published in this journal when a larger amount of material has been treated.

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On the Phosphatase Activity of Low-phosphorus *Torulopsis utilis*

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In a previous work Rautanen and Miikkulainen [1] have shown that the starvation of *Torulopsis utilis* yeast in respect to phosphorus is followed by a considerable decrease in various important phosphorus as well as nitrogen fractions of the cells. Concerning the physiological properties of the low-phosphorus yeast cells Wiame [2] has earlier shown with baker's yeast that these cells when placed in a medium containing phosphate have a peculiar ability to synthesize and accumulate inorganic metaphosphate in the cells. When investigating nearer this anomaly in the phosphorus metabolism of the low-phosphorus *Torulopsis* yeast cells we have observed very interesting changes in the activity of the acid phosphatase of the yeast cells of different phosphorus contents.

The cultivation of the normal, low-phosphorus and metaphosphate containing yeast cells was performed as reported earlier [1]. The phosphatase determinations were made both with fresh and dry yeast

preparations at pH 4.5 (acid phosphatase) and at pH 8.6 (alkaline phosphatase). Disodium phenylphosphate (Merck, p.a.) was employed as the substrate and the rate of the hydrolysis was followed by the determination of the liberated phenol with the Folin-Ciocalteau phenol reagent. The activity was calculated in Rae-Eastcott units (amount of phenol in mg liberated per 10 mg of the dry preparation from a 0.01 *M* solution in 20 min at 37° C).

As can be seen from the curves in Fig. 1 the decrease of the phosphorus content of the yeast cells during the starvation process is followed by a steady increase in the phosphatase activity of the cells. It is interesting to note that this activity of the normal yeast cells cultivated in excess of phosphate is practically zero. The activity increases during the starvation as long as the phosphorus content of the cells decreases.

The changes in the phosphorus content and in the phosphatase activity of the low-phosphorus yeast cells when placed again in a medium containing phosphate are illustrated in Fig. 2. The enormous

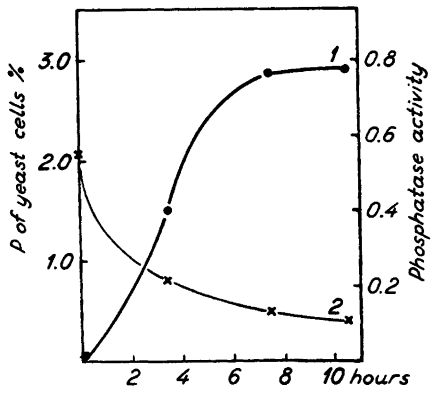

Fig. 1. Changes in phosphatase activity and total phosphorus content of yeast cells during the starvation in respect to phosphorus.

Curve 1: Phosphatase activity
Curve 2: Total P of yeast cells

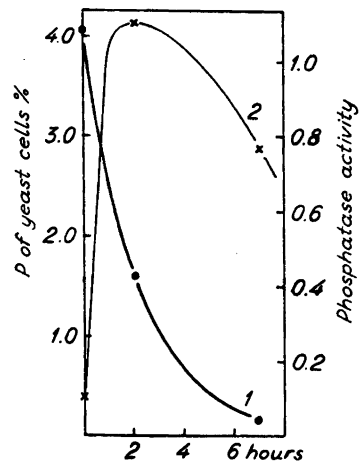

Fig. 2. Changes in phosphatase activity and total phosphorus content of yeast cells during the uptake of phosphate by low-phosphorus yeast.

Curve 1: Phosphatase activity
Curve 2: Total P of yeast cells

increase of the phosphorus content of the cells during the first two hours is due to the accumulation of inorganic metaphosphate in the cells. This metaphosphate disappears then continually and the phosphorus content of the cells falls toward the normal level. The phosphatase activity begins immediately to fall after the placing in the phosphate medium and this drop is most remarkable just during the accumulation of the metaphosphate in the cells.

The activities of the fresh and dry yeast preparations when calculated per dry matter were in every case practically the same.

When the phosphatase determinations were made at pH 8.6 (alkaline phosphatase) there could not be observed any activity in the normal or in the low-phosphorus yeast cells.

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