

It would appear that the theories for beta amylase action, proposed by Cleveland and Kerr and by Swanson and Cori, more adequately interpret all pertinent data than alternative proposals in the past.

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³ Meyer, K. H., "Natural and Synthetic High Polymers", **4**, 415 (Interscience Publishers, Inc., New York, 1942).

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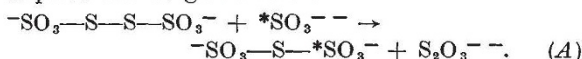
¹² Meyer, K. H., Bernfeld, P., Gürtler, P., and Noelting, G., *Helv. Chim. Acta*, **31**, 108 (1948). See also, *J. Phys. Coll. Chem.*, **53**, 319 (1949).

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Mechanism of Decomposition of Polythionates and Formation of a Sulphinic Acid

By the use of the radioactive isotope of sulphur, ³⁵S, the following reactions have been investigated.

(a) By the application of different chemical reactions, Olav Foss^{1,2} has made it probable that the reaction between sulphite and tetrathionate consists in a displacement of a thiosulphate group by a sulphite ion as given below:



We have been able to corroborate this view by the following experiments.

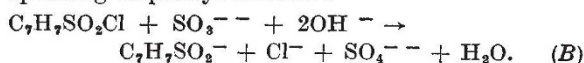
Active sodium sulphite was treated for about one hour in solution with potassium tetrathionate in excess (exp. No. 1, 1:4; exp. No. 2, 1:2). The value of pH was about 6.1, and the temperature 20° C. After the reaction had taken place, the solution was strongly acidified with hydrochloric acid. The sulphur dioxide evolved was absorbed in a potassium triiodide solution by passing a stream of nitrogen (fraction I). Free sulphur was filtered off, washed and converted to sulphuric acid by prolonged boiling with nitric acid (fraction II). From both fractions barium sulphate was precipitated. In experiment No. 2, the sulphur in the remaining part was converted into sulphate and precipitated as barium sulphate (fraction III). A search for the activity gave the following results: fraction II was completely inactive. In both experiments fraction I contained about 3 per cent of the original activity, while the balance was found in fraction III. The reaction thus follows the course predicted by O. Foss.

The small activity found in the sulphur dioxide fraction may be due to a certain reversibility of reaction (A), as we have made sure that all sulphite had reacted.

(b) By the investigation of the reaction between active sulphite and potassium pentathionate we have obtained similar, although more complicated results. Foss's assumption that the reaction between sulphite and polythionates is simply an exchange of a

sulphite ion with a thiosulphate ion is again in complete agreement with the experimental facts.

(c) Formation of sulphinic acid from the corresponding sulphonyl chloride:



p-Toluene sulphonyl chloride was boiled with active sulphite in the presence of sodium carbonate. The solution was acidified with hydrochloric acid, and the sulphinic acid extracted with ether. The sulphate ions were precipitated as barium sulphate. The acid proved to be completely inactive, while the barium sulphate contained all the activity. We thus find that the sulphonyl sulphur remains bound to the carbon atom, which is in complete accordance with classical views.

Further studies will be carried out on these lines, and a detailed report will appear in *Acta chemica Scandinavica*.

We wish to thank N. Hofman-Pang for having supplied us with tetrathionate and pentathionate, and K. Zerahn for help in measuring the activities.

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¹ *Det kgl. Norske Videnskabernes Selskabs S.rifter*, No. 2 (1945). (In English.)

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Soil Copper Deficiency in County Offaly, Ireland

ON a farm where a feeding experiment in connexion with phosphate deficiency in pasture herbage was in progress, a heifer showing extreme emaciation and excessive scouring was brought to my notice. The scour, which was almost continuous, was thin and watery, green to black in colour with numerous small bubbles, and had persisted for a period of more than two months. It started in January while the heifer was fed on old meadow hay of very poor quality grown on peaty soil, moist sugar pulp and a small amount of herbage consumed from a rather bare moory pasture. The soil on the farm, which appears to be comparable with that on which successfully treated similar cases are reported elsewhere¹⁻³, is composed mainly of peat resting on marl, and is slightly acid in reaction.

Parasitic infestation was first suspected, and the well-known remedies for parasitic gastro-enteritis and liver fluke were administered with negative results. It was then decided to give copper treatment, and a solution was made by dissolving one ounce of copper sulphate in a pint of water. One ounce of this solution was mixed with a pint of water and given as a drench. A second drench was given after an interval of one day.

Results were forthcoming almost immediately: scouring ceased, and the faeces assumed normal consistency. After an interval of three weeks, slight scouring again occurred. A drench given at this stage gave results similar to those experienced in the first instance. The heifer has considerably improved in health and body condition.

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