



An alternative carbon chain (V), from which the *nor*-tropanone structure could conceivably be derived, would be obtained by cleavage of the benzenoid ring of (II) between C₆ and C₁.

In *Erythroxylon truxillense*, tropane bases are accompanied by hygrine, and both types of alkaloids are found in the genus *Convolvulus*¹¹. Also hyoscyamine and cuskhygrine are reported to occur together in *Scopolia lurida*. These co-occurrences likewise are probably of biogenetic significance, and the hypothetical intermediate (III), which serves above as a source of the tropane structure, could also give rise to the *nor*-hygrine structure (VI) by the appropriate cyclization. The longer carbon chain of cuskhygrine is difficult to account for by this hypothesis. It may be that the plant contains an enzyme system by which hygrine or a precursor is condensed with a compound such as 4-methylaminobutanal.

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Action of Ninhydrin on Keratin

ALTHOUGH ninhydrin has long been used as a sensitive reagent for the detection of amino-acids, its remarkable cross-linking action on protein fibres appears to be unknown. In the case of wool keratin, the reaction, the extent of which is independent of pH between pH 4.8 and 8.3, takes place slowly at ordinary temperatures and is incomplete in 48 hr. With a boiling 0.0685 M solution at pH 4.8, however, cross-linking proceeds so rapidly that after treatment for 15 min. the fibres show a 25.8 per cent increase in resistance to extension (30 per cent) in

water at 22.2° C. Since the extent of reaction is reduced when the lysine side-chains are blocked by means of 1-fluoro-2:4-dinitrobenzene or nitrosobenzene, and since no strengthening is obtained with completely deaminated fibres, the basic side-chains of keratin must play a fundamental part in the cross-linking reaction.

Besides being capable of strengthening intact fibres, ninhydrin is even more effective with damaged fibres. When, for example, wool fibres were treated with thioglycolic acid until their resistance to extension in water at 22.2° C. was reduced 23.9 per cent, subsequent treatment with the boiling solution of ninhydrin for 15 min. gave fibres the resistance of which to extension was 21.9 per cent greater than that of untreated fibres.

Ninhydrin is thus by far the most effective cross-linking agent so far discovered for keratin, and there is every reason to expect that related compounds, which give uncoloured derivatives, will find extended use in processes for reinforcing protein synthetic fibres as well as natural fibres.

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Alkaline Earth Uranates of the R₃MX₆ Type

ALKALINE earth uranates of the *RMX*₄ type are well known and the crystal structures of, for example, the calcium and strontium compounds CaUO₄ and SrUO₄, respectively, have been investigated in detail¹.

While studying phosphors of the CaO(U) type, it was decided to investigate the formation of other possible uranate compounds. A range of samples containing varying ratios of calcium to uranium was prepared and a transition in fluorescence properties was observed at a 3 : 1 ratio. It was suspected that a calcium compound having the composition 3CaO : 1UO₃ had been prepared, and an X-ray investigation showed the existence of a new compound. Other similar uranates were prepared and it was found that the new materials possessed the same pseudo-cubic crystal structure as alkaline earth tungstates of the R₃WO₆ type², and fluorides of the cryolite, Na₃AlF₆, type³.

The above tungstates and fluorides approach and attain full cubic symmetry (space group *Fm3m*) when ionic dimensions are favourable. The ideal structure involves cations occupying two different sites with relative abundance of 2 : 1. For this reason, and because ionic radii are favourable, Ba₂CaWO₆ possesses the full symmetry of the *Fm3m* cubic space group. With this in mind, the further uranate Ba₂CaUO₆ was prepared. The X-ray powder photograph, while revealing slight deformation from the fully cubic arrangement, owing no doubt to the difference in volume between the UO₆ group and the WO₆ group, confirmed that the uranates follow the same general behaviour as the corresponding tungstates.