blanks, in the absence of reducing agents, were reported to have been run (8). It is possible that the "greater ease" with which the FA can be oxidized (11, 12) accounted for the lower values for this FA as compared to those for the HA samples (8).

**Oximation for Total C — O Groups**—Suitability of this technique had been checked with another method (8, 10). The latter measured only 25 to 30% of the functions in 3 out of 4 quinones tested (10). The oximation of quinones is known to be often nonquantitative (1). As for example, the calculations based on increased N content as = NOH were not confirmable by the C content of the product of FA and NH₂OH (9).

**Infrared Evidence**—Suggestions for spectroscopic evidence of quinones were criticized (8) mostly for size of the concerned peaks, and reference made to a paper entitled, “Spectroscopic and Chemical Evidence of Quinones in Soil Humus.” On the pages of the journal volume cited for this reference (No. 7 of 8) is a paper entitled, “Infrared Evidence of Quinones in Soil Humus” and it includes differential spectra as part of the evidence (5). This and another publication (5, 6) also indicated why other attempts (9) were, in fact, inconclusive due to presence of H₂SO₄ in the purportedly nonreductive acetylation and, in the other case, choice of the oxidizing agent for back titration.

**The Biochemical Study** (4)—Contrary to the claims made in criticism (8) of this study (4), it did report range of error in estimation (7 ± 1% and 5 ± 0.25%). Also, the estimations were not solely based on comparison of color intensities of spots on thin layer plates.

**Compatibility with Results of Chemical Studies**—It is not surprising that no quinones were found among the products of KMnO₄ oxidation of the FA (8) or the compounds separated from methylated FA. The quinones are susceptible to oxidation (4). The substances isolated from methylated FA constituted, without the added —CH₃ groups, less than 1% of the FA (3).

**Literature Cited**


5. Vasilyevskaya, and Fe. 1954. The Alkaline SnCl₂ Method—In order to prepare sufficient insoluble residue material for a number of measurements, we did five separate analyses, of 200 mg of FA plus 10 ml of SnCl₂ solution (1.75 g of SnCl₂ · 2H₂O in dilute HCl) (8). Followed sealed tubes for 4 hours at 120°C, the insoluble residues were separated from the supernatant solution, combined, and dialyzed against distilled water and chloride. The nondialyzable material, after filtration and drying in a vacuum desiccator, weighed 921.0 mg. Heating of a representative sample at 750°C for 4 hours resulted in a weight loss of 57.6% (= 531.1 mg FA) and a residue of 42.4% (= 390.5 mg) of SnO₂. The amount of Sn withdrawn (8), the theoretical amount should have been 3.1 meq × 75.35 = 233.6 mg of SnO₂ plus 10.0 mg due to ash in the FA; that is, a total of 243.6 mg. Thus, about 150.0 mg of the ash remained unaccounted for. Further analyses showed that the ash, a light yellow powder, was free of C and Cl. This (KBr pellet) of the ash showed the following bands: 3640 cm⁻¹ (strong), 610 cm⁻¹ (medium), and 670 cm⁻¹ (medium). These bands were identical to those of SnO₂. In addition, the spectrum of the ash exhibited bands at 1640 cm⁻¹ (medium) and 3450 cm⁻¹ (strong), likely to H₂O, which could not be removed during filtration at 750°C. From the chemical and spectroscopic evidence, it appeared that the ash was collected as SnO₂. If x = 5 or greater, all of the weight of SnO₂ accounted for. The strong H₂O-bands in the ash spectrum suggested that this was a reasonable assumption. In the context of this discussion the exact chemical nature of the ash is a matter of only secondary importance. It is significant that FA and other humic substances can withdraw significant amounts of Sn from acid solution, and this may account for the evidence, it appeared that the ash was colloidal SnO₂. Published May, 1973

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