

allow a conclusion that this applies to all types of sulfite and sulfate pulps. Highly refined sulfite pulp is at least as good as linters as far as brightness stability is concerned, in spite of the higher copper number.

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Aliphatic Ditellurides

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Only two aliphatic ditellurides are described in literature; ditellurium-diacetic acid ($\text{HOOCCH}_2\text{TeTeCH}_2\text{COOH}$) and ditellurium- α -dipropionic acid^{1,2}. These substances have been prepared by reduction of the trichlorotellurium compounds obtained by the interaction of tellurium tetrachloride with the corresponding acid anhydrides. This method seems to be suited only for the introduction of the tellurium function in the α -position relative the carboxylic group.

The author has started an investigation of synthetic methods for aliphatic ditellurides in general. This paper gives a preliminary report of the reaction between aliphatic halogen compounds and the Te_2^{2+} ion. The first electronic excitation band for di-*n*-butylditelluride and ditellurium-diacetic acid has been determined and compared with that for disulfides and diselenides extensively studied by Schotte^{3,4} and Bergson^{5,6}. An infra-red investigation of the ditellurides is being

prepared. A polarographic investigation of ditellurium-diacetic acid has been started by Nygård⁷.

A sodium ditelluride solution was prepared by dissolving finely powdered tellurium in an alkaline solution of sodium formaldehyde sulfoxylate (Rongalite C). When excess Rongalite C is used for the preparation of sodium telluride solution the tellurium is readily dissolved⁸, but in the preparation of sodium ditelluride the molar ratio between tellurium and Rongalite C must be 2:1, and it is then necessary to reflux and to stir the mixture for several hours. The sodium ditelluride solution (which certainly contains also some telluride and polytelluride) reacts readily with *n*-butyl bromide. An attempt to prepare ditellurium-diacetic acid in this way from chloroacetic acid failed, because this acid oxidized the ditelluride ion to elementary tellurium, and from the reaction mixture acetic acid was isolated. Sodium telluride reacts in the same way with chloroacetic acid. Here we have a difference between tellurium, selenium and sulfur, because disulfide-, sulfide-, diselenide- and selenide ions react in the normal way with α -haloacids. These facts should be compared with the oxidative action of vic-dihalides on selenoles^{9,10} contrary to their behavior towards thiols, and with the oxidation of sodium disulfide by bromomalonic ester¹¹.

Di-*n*-butylditelluride has an absorption band with maximum at 3 990 Å as can be seen from Fig. 1. The author has shown that the lowest electronic excitation energy for disulfides and diselenides can be expressed by an empirical formula with the parameters α and β :

$$E = \alpha\sqrt{k} + \beta$$

with $\alpha_s = \alpha_{se}$, where k is the number of hydrogen atoms joined to the α -carbon atom⁶. The author hopes to be able to test the validity of this relation for ditellurides. An increase in excitation energy is found when the molecule contains a carboxylic group close to the S—S or Se—Se group. For diselenium-diacetic acid ($\text{HOOCCH}_2\text{SeSeCH}_2\text{COOH}$) the band is overlapped by a high intensity band ($\lambda_{\max} = 2\,290\text{ Å}$) and is only detectable⁶ as an inflexion at 2 930 Å. The same behavior has been found for ditellurium-diacetic acid (inflexion at 3 600 Å). The 2 290 Å band of the selenium compound has its correspondence in a band with $\lambda_{\max} = 2\,730\text{ Å}$.

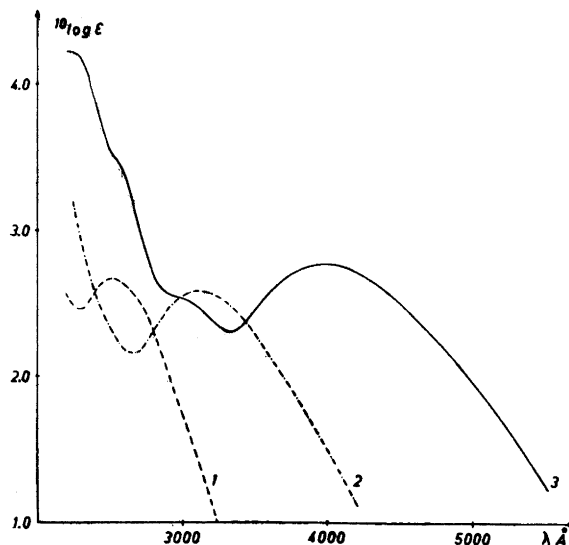


Fig. 1. Ultraviolet absorption of:
 1. Di-*n*-propyldisulfide¹³.
 2. Di-*n*-butyldiselenide⁵.
 3. Di-*n*-butylditelluride, in (cyclohexane).

Experimental: *Di-n-butyliditelluride*. In a 500 ml three necked flask 9.24 g Rongalite C and 9.0 g sodium hydroxide are dissolved in 200 ml water. The flask is flushed out with nitrogen, and 15.32 g finely powdered tellurium is added. The mixture is vigorously stirred under reflux for 5 h. After that time 16.4 g *n*-butyl bromide is added dropwise, the mixture is allowed to cool, and the stirring continued for 30 min. The content of the flask is extracted with 2 × 150 ml ether, the extract dried with CaCl₂, and the ether distilled off in a nitrogen atmosphere. The residue is distilled in vacuum (nitrogen) and the fraction boiling between 112–115°/1.5 mm Hg is collected. The ditelluride is a dark red oil with a pungent smell. Yield 23 %. (58.70 mg subst. gives 40.91 mg Te. Found: Te 69.7. Calc. Te 69.1). The analysis was carried out according to Drew and Porter¹².

Ditellurium-diacetic acid was prepared according to Morgan and Drew¹. The spectra were determined with a Beckman model DU (2 200–4 000 Å) and a Beckman model B (4 000–5 500 Å) photoelectric spectrophotometer.

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