

filtration, and the filtrate, containing the Fe^{++} , titrated with standard permanganate in the usual manner.

Lundell and Knowles⁵ have shown that sulfuric acid solutions of uranous sulfate, like ferrous sulfate, exhibit marked stability toward air oxidation, and we hope to employ our differential oxidation procedure in the evaluation of uranium in solutions containing U^{++++} and Ti^{+++} .⁶ Other determinations, involving similar combinations, suggest themselves as possibilities in the further application of this method.

In the course of this work, a technique has been developed for the preparation of very pure solutions of titanous sulfate and titanous sulfate.

We expect to publish a complete account of this work in the near future.

⁵ Lundell and Knowles, *THIS JOURNAL*, **47**, 2637 (1925).

⁶ Cf. Newton and Hughes, *ibid.*, **37**, 1711 (1915).

⁷ J. T. Baker Chemical Company Fellow in Analytical Chemistry, 1930-1931.

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PENTAVALENT BORON

Sir:

A compound of boron has been prepared which has the formula BR_3Na_2 in which R is the α -naphthyl group. This compound seems to be of a type not heretofore known and to be of particular interest from the standpoint of valence theory.

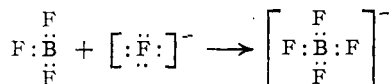
The compound has been prepared by treating tri- α -naphthyl boron in ether solution with 40% sodium amalgam in the absence of air and water.¹ The solution turns first yellow and finally black as the reaction progresses. Upon hydrolyzing the ether solution and titrating with acid the number of mols of sodium was found to be twice (1.97-1.98) the number of mols of the tri- α -naphthylboron originally introduced into the solution. The compound was then prepared in crystalline form from a mixture of ethyl ether and petroleum ether. It is nearly black in color, somewhat resembling iodine in appearance. This material was analyzed for sodium and boron. A second crop of crystals was obtained from the mother liquor. This had the same appearance and gave the same analysis. The analyses indicated one molecule of ether of crystallization, which was removed quantitatively by evacuating and heating to 175°. The first analysis given below is for the first crop of crystals, the second for the crop

¹ A solution of this compound was undoubtedly first obtained by Krause and Nobbe [*Ber.*, **63**, 934 (1930)] but inasmuch as they did not analyze their product they naturally assumed that it was a monosodium addition compound as in the case of triphenylboron.

from the mother liquor before heating and the third for this same material after heating to remove ether.

Anal. Calcd. for $C_{30}H_{21}BNa_2$: Na, 10.50; B, 2.47. Found: Na, 10.59; B, 2.49. Calcd. for $C_{34}H_{31}OBNa_2$: Na, 8.98; B, 2.11. Found: Na, 8.92; B, 2.15. Calcd. for $C_{30}H_{21}BNa_2$: Na, 10.50; B, 2.47. Found: Na, 10.53; B, 2.40.

Compounds of boron showing a valence of more than three are of course known, such as KBF_4 . In such cases an octet is completed by four covalent bonds thus



No compound has been reported, however, in which the boron completes its octet by taking two electrons from different atoms to give ionic linkages. Thus no compound is known of the formula Na_2BF_3 . It now appears that in case the three fluorine atoms are replaced by three naphthyl groups, then the boron atom can complete its octet by taking two electrons from two sodium atoms. How these sodium atoms are held is a question to be decided by further experiment. This work is being continued.

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THE ACTIVATOR OF CATALASE¹

Sir:

The activation of glandular proteinase (cathepsin) by glutathione² and other —SH compounds points to a connection between enzymic hydrolysis and the sulfur oxidation–reduction system of Hopkins. A connection of the sulfur system to enzymic oxidation is also indicated, however, by our findings that the catalase activity (of pig's or lamb's liver) is increased by S–S derivatives, namely, cystine, insulin and oxidized glutathione. In liver juice, which contains sulphydryl derivatives, the catalase may therefore be activated by all manner of oxidizing agents, such as iodine, ferric iron, oxygen and hydrogen peroxide, so that in the usual preparations of catalase the enzyme will be found completely active.

The natural activator which occurs in the liver press juice is not cystine, since in larger amounts this again inhibits the catalase action, but in view of the quantity of glutathione present in liver, it may be that the natural activator is, in part at least, composed of oxidized glutathione.

Since the presence of —SH derivatives accelerates proteolysis, and that of S–S derivatives, the decomposition of hydrogen peroxide, it would there-

¹ Food Research Division Contribution No. 145.

² *Naturwissenschaften*, **18**, 645 (1930).