It would seem from what has been set forth, that not only is the process above described the most valuable and revolutionary ever invented for the manufacture of white lead, but that there is not a probability of any other process taking its place, in the near future.

This new process was invented in 1892, by Arthur Benjamin Brown, a chemist and mining engineer of Boston. It is to-day for the first time made public. The reason this has not before been done is because time was necessary to complete many details for production on a large scale, and to secure requisite patents. These are now completed, and a large company is organized to put the process into practical operation. I propose for this invention the name—The Brown Electrolytic Process.

THE CHLORIDES OF ZIRCONIUM.[1]

BY F. P. VENABLE.

Received September 9, 1895.

IN a report upon the examination of the chlorides of zirconium[2] it was stated that pure zirconium tetrachloride was formed by the solution of zirconium hydroxide in hydrochloric acid and repeated crystallization from the concentrated acid. This statement was based on a partial analysis by Linnemann[3] the result of which made him call the substance the tetrachloride ; and on repeated partial analyses of my own in which the zirconium present was determined by ignition as zirconium dioxide. So firmly convinced was I of the fact that this was the normal tetrachloride that I determined to use it in revising the atomic weight. Ten closely agreeing determinations were made and they yielded as the percentage of zirconium dioxide found 52.99, or, calculating with 90.62 as atomic weight of zirconium (Bailey) 39.16 per cent. of zirconium. The zirconium in the tetrachloride amounts to 38.99 per cent.

Bailey made several very widely differing determinations of the chlorine in this body and considered it the oxychloride. His determinations varied so greatly and his mode of drying were so faulty that I simply concluded he was mistaken, being

1 Read at the Springfield meeting.

2 *J. Am. Chem. Soc.*, *1894*, 16, 460–475.

3 Lond. Chem. News, 52, 233–240.

unable to detect a source of error in my analyses which would allow for a change from 39.16 per cent. of zirconium to 46.79 per cent., the amount needed for the oxychloride.

Still, as a necessary precaution, I made some determinations of the chlorine in the pure crystalline product and was greatly surprised to find only 35.5 per cent. of chlorine instead of 61.01, the amount required for the tetrachloride. The percentage in the oxychloride would be 36.63.

I regard the results as very singular. The substance must be an oxychloride, but what is its composition? The simplicity of its preparation and the constancy of its composition along with its stability would argue for a simple formula. No such formula can be calculated from the analysis. Probably the best formula suggested for this oxychloride, corresponding closely with the above analysis, is $Zr_3(OH)_5Cl_7.5H_2O$.

UNIVERSITY OF NORTH CAROLINA,
August, 1895.

[CONTRIBUTIONS FROM THE CHEMICAL LABORATORY OF THE ROSE POLYTECHNIC INSTITUTE. NO. 7.]

THE DETERMINATION OF THE HEATING EFFECTS OF COALS.[1]

BY W. A. NOYES, J. R. MCTAGGART, and H. W. CRAVER.[2]

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MANY determinations have been made for the purpose of comparing the heating effect of coals as determined by the calorimeter with that calculated from analyses. Scheurer-Kestner, who seems to have been the first to show that the results obtained in the two ways do not agree, publishes results obtained with the calorimeter of Favre and Silbermann, which differ, in some cases, by ten per cent. from those calculated by Dulong's formula and are uniformly higher.[3] In a later paper[4] he states that he finds lower results with Bertholet's bomb but still results that differ from those calculated.

[1] Read at the Springfield meeting.

[2] The work of which this paper gives an account formed the basis of theses presented to the faculty of the Rose Polytechnic Institute for the degree of Bachelor of Science.

[3] *Compt. rend.*, 106, 1092, 1160, 1230.

[4] *Ibid*, 112, 233.