ing the proposed synthesis. Whether others will succeed where these have failed is an open question; at any rate the theoretical importance to be attached to the possibility of existence of such a hydrocarbon as $C_6H_4\left\langle \overset{C}{\underset{C}{\|}} \right\rangle C_6H_4$ makes it desirable that all the methods be tried.

CHICAGO, March 1, 1895.

ON THE REACTION BETWEEN ZINC SULPHATE AND POTASSIUM HYDROXIDE.[1]

BY C. E. LINEBARGER.

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It is customary in books on analytical chemistry to represent the precipitation of zinc hydroxide from solutions of its sulphate by means of potassium hydroxide, and its redissolution by the action of an excess of the alkali by these two equations:

$$(1)\ ZnSO_4 + 2KOH = Zn(OH)_2 + K_2SO_4.$$
$$(2)\ Zn(OH)_2 + 2KOH = ZnO_2K_2 + 2H_2O.$$

These equations are, however, far from corresponding to actuality, and it seems really deplorable that chemists in their desire to formulate compounds and balance equations should, by symbolical representations on paper, give the impression of having duly explained such a reaction as the above, which even a superficial examination shows to vary considerably with the temperature, dilution, and relative masses of the components.

The general scheme followed out in this preliminary study of the reaction of the two salts in question consisted in the addition to a constant quantity of zinc sulphate, varying quantities of potassium hydroxide, the total volume and temperature of the

[1] This investigation was begun in 1888 in the chemical laboratory of the Northwestern University at the suggestion and under the guidance of Prof. A. V. E. Young. It had been the intention to study the reaction between zinc sulphate and potassium hydroxide in a manner analogous to that in which Prof. Young had made "A Thermochemical Analysis of the Reaction between Alum and Potassium Hydrate," published in the Proceedings of the American Academy of Sciences and Arts, June 10, 1885. Only certain preliminary experiments, however, had been performed when I left the University, and the research has not received further attention at the hands of Prof. Young or myself. While these preliminary experiments can be said to be but a small part of the work necessary for the elucidation of the problem of the chemical equilibria presented by the system of zinc sulphate, caustic potash, and water, yet they possess a certain interest, especially for analytical chemistry, which may warrant their being made known.

system being kept constant in all experiments, and the immediate analysis of the precipitate. The details were as follows: 36.2 cc. of a solution containing two grams of anhydrous zinc sulphate were brought into a graduated 500 cc. flask, and diluted to about 225 cc. The required quantity of potassium hydroxide solution was also diluted to about the same volume and added to the zinc sulphate. The flask was briskly shaken, the volume of the mixture made up accurately to 500 cc., again well shaken, so as to insure a homogeneous mixture, and the whole thrown upon a large dry filter. Portions of fifty cc. each of the filtrate were taken and analyzed, duplicate determinations being made of zinc and sulphuric acid, and in some cases of potassium. The sulphuric acid was determined volumetrically by precipitation with barium chloride according to Wildenstein's method, the zinc, volumetrically by precipitation with sodium sulphide, lead acetate in alkaline solution being used as indicator, and the potassium, gravimetrically as potassium sulphate. From the analysis of the filtrate, it is easy, since the total amounts of substances present in the system are known, to calculate the composition of the precipitates.

Before the communication of the results of these experiments, it is well to mention a couple of experiments, designed, one to find out the amount of fixed alkali necessary to just precipitate all of the zinc, the other to ascertain how much was required to redissolve the precipitate. In the first experiment, potassium hydroxide was added, from a burette, to a solution of zinc sulphate of known concentration, until the resulting solution was alkaline, care being taken that the same amount of zinc sulphate and about the same amount of water was present as in the precipitation experiments. It was found that one molecule of anhydrous zinc sulphate is precipitated by 1.62 molecules of potassium hydroxide.

In the second experiment, potassium hydroxide was added from a burette to a solution containing one molecule of anhydrous zinc sulphate until the precipitate, at first formed, redissolved, 13.2 molecules of the alkali being required. In this case, however, the dilution was somewhat different from that in the precipitation experiments.

In Table I are given the results of the experiments :

TABLE I.

I. No. of Ex.	II. Mols. KOH to one mol. $ZnSO_4$.	III. Per cent. ZnO in precipitate.
1	0.25	17.11
2	0.50	35.10
3	1.00	68.08
4	1.62	100.00
5	2.00	98.49
6	3.00	96.79
7	5.00	89.76
8	7.00	68.87
9	13.20	0.00

If these data be plotted in a curve, the axis of abscissae being the number of molecules of potassium hydroxide to one molecule of anhydrous zinc sulphate, and the axis of ordinates being the per cent. of zinc oxide in the precipitate, it is seen that the curve at first ascends almost in a straight line to ordinate = 100, and abscissa = 1.62 (the point of complete precipitation), and then falls to ordinate = 0, and abscissa = 13.2 (the point of re-solution) in a perfectly regular manner.

CHEMICAL BRICK FOR GLOVER TOWERS.

BY IRVING A. BACHMAN.

Received January 15, 1895.

IN the last year, Chemical Brick for Glover Towers, from a new locality,[1] have been placed upon the market, which in physical appearance and color are like the famous Blue Welch Brick, and in quality rival them.

Specific gravity, 1.93. Hardness, 7.5.

Color, umber blue. Fracture, blue.

Silica,	SiO_2	72.11 per cent.
Alumina,	Al_2O_3	20.58 "
Iron oxide,	Fe_2O_3	5.48 "
Calcium oxide,	CaO	0.92 "
Magnesium oxide,	MgO	0.54 "

A whole brick placed in the bottom of working Glover Tower, acid at 62° B. and 310° F., lost as follows :

1 Manufactured from the Aiken, S. C., clays.