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A NEW AND RAPID METHOD FOR THE DETERMINATION OF
POTASSIUM IN POTASH WATERS

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S A U L B R Y A N A R E N S O N

A THESIS

PRESENTED TO THE FACULTY OF
THE GRADUATE COLLEGE IN THE UNIVERSITY OF NEBRASKA
IN PARTIAL FULFILMENT OF REQUIREMENTS
FOR THE DEGREE OF MASTER OF ARTS
DEPARTMENT OF CHEMISTRY

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1.

Due to the fact that this University had received so many potash waters for analysis, especially during the last year, my attention was centered to the various methods for the determination of Potassium. In our department we were, at that time, using the Chlor-platinate method, but later changed to the Perchlorate method, which has been giving us very satisfactory results.

We had always used the sodium cobaltic nitrite solution as a reagent for the qualitative determination of potassium, but as far as I was able to find out had never used it in a quantitative test.

Several methods are known for the determination of potassium by the sodium cobaltic nitrite method. To decompose the yellow precipitate formed by the addition of $\text{Na}_2\text{Co}(\text{NO}_2)_6$ to an acetic acid solution containing some potassium salt, by boiling with sodium hydroxide and then determining the K_2O value from the filtrate by the chlorplatinate method, as has been suggested, seemed to me to be almost as long a process as the standard chlor-platinate method.

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2.

Since the yellow precipitate could not be weighed and the K_2O value determined directly, nor could it be titrated in acid solutions against a standard permanganate solution, because of the irregularity of results, I looked up the literature of this yellow potassium cobaltic nitrite.

I found that authors differed as to the composition of this salt. (1) Addie and Wood, gave it the formula $K_2NaCo(NO_2)_6 \cdot H_2O$ as did (2) Treadwell and Hall; while (3) Prescott and Johnson; and (4) Dales and Barnaby consider the precipitate as $K_2Co(NO_2)_6$. In looking over the literature I found an obscure note in Watt's Dictionary of Chemistry under "Cobalt Yellow," a note stating that this salt was turned immediately into the black sulphide of cobalt, by the addition

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- (1) Journal American Chemical Society 77, 1070 (1900)
 - (2) Treadwell and Hall, Analytical Chemistry
 - (3) Prescott and Johnson, "Qualitative Chemical Analysis"
 - (4) Dales and Barnaby, "Qualitative Chemical Analysis"