

cibles with platinum felt as the filtering medium. Munroe in his original publication refers to his device simply as "Filters of Metallic Felt," and other writers have used the name "Gooch-Munroe"<sup>1</sup> and "Munroe-Neubauer"<sup>2</sup> crucible. The writer sees no necessity for this hyphenation, since Munroe has undoubted priority in the use of platinum felt as a filtering medium in a filtering crucible, in all the three elements which are involved in the conception and presentation to science of an idea; *viz.*, invention, experimentation, and published description, and accordingly the only name which seems suitable is that used as the title of this article.

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## THE ACTION OF COKE ON FERRIC CHLORIDE AND AURIC CHLORIDE IN SOLUTION.

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W. O. de Coninck<sup>3</sup> states that when solutions of auric, platinumic or ferric chloride are filtered through animal charcoal or powdered coke the metal is retained by the filter. No quantitative data are given in the paper cited.

This behavior of perchlorides with coke came to be of interest to the present writer, and so led to a short series of experiments under definite working conditions, which may be of sufficient interest to be recorded as showing some of the limitations which should qualify de Coninck's statements. The action of animal charcoal was outside the scope of the present work.

The coke used was powdered to such size that it passed through a sieve of 20 meshes to the inch, but not through one of 40 meshes. Two series of experiments were made, one being on coke which was merely thus pulverized and another on "washed coke." To prepare the latter, previously pulverized coke was boiled with pure concentrated hydrochloric acid, washed with distilled water till the washings gave only a faint precipitate with silver nitrate solution, and dried by heating in a dish on the hot plate.

Each coke filter was made by placing a plug of glass wool just above the top of a Jones "reductor" and filling in the space above to a height of 20 cm. with coke. The approximate weight of this amount of coke was 40 grams. It may be remarked that this method of procedure differs slightly from that of de Coninck, who states that he used (in his experiments with animal charcoal) a funnel 8 to 10 cm. in diameter, three-quarters filled with the filtering material, but gives no details of his experiments with coke. The solutions used were auric chloride, ferric

<sup>1</sup> THIS JOURNAL, 29, 633 (1907).

<sup>2</sup> *Ibid.*, 30, 1456 (1908).

<sup>3</sup> *Compt. rend.*, 130, 1551-1552

chloride, and "basic ferric chloride." The auric chloride solution was made by dissolving a carefully weighed quantity of pure gold in "aqua regia," evaporating to dryness, moistening with hydrochloric acid, again drying and then making up to a known volume with water. It was thus as nearly neutral as possible. Ferric chloride solutions were made by dissolving the crystallized salt in water, the solutions being subsequently standardized against decinormal potassium dichromate.

The solutions of "basic ferric chloride" were made by adding sodium carbonate to a known quantity of standard ferric chloride solution till the precipitate formed dissolved with difficulty, and then diluting to a definite volume.

In each experiment 100 cc. of solution were poured into the filter and allowed to percolate into a receiving flask. The solutions were all at the temperature of the laboratory ( $14^{\circ}$ – $16^{\circ}$ ). The rate of percolation was regulated by the tap of the reduction tube to about 5 cc. per minute, except in one case to be noted later. The composition of the solutions after filtration was determined by analysis of aliquot portions and was calculated back to 100 cc.

It was found that ferric solutions, after passing through the coke filters, were in every case partially reduced to the ferrous state.

The experiments are tabulated in two series, according to whether the coke used was or was not washed.

#### EXPERIMENTS ON WASHED COKE.

Experiment No.	Nature of solution.	Grams of metal in 100 cc. of solution before filtration.	Grams of metal in 100 cc. of solution after filtration.	Per cent. of metal lost or gained during filtration.	Grams of iron reduced to ferrous state.	Per cent. of iron reduced to ferrous state.
1	Ferric chloride.....	0.55023	0.53590	—2.60	0.00859	1.56
2	Ferric chloride.....	0.28428	0.28228	—0.72	0.00143	0.50
3	"Basic ferric chloride"..	0.27511	0.25505	—7.29	0.00687	2.50
4	Auric chloride.....	0.20390	0.11728	—42.48	.....	.....

#### EXPERIMENTS ON UNWASHED COKE.

5	Ferric chloride.....	0.27511	0.27798	+1.04	0.06190	22.50
6	"Basic ferric chloride"..	0.27511	0.25677	—6.66	Not determined	
7	"Basic ferric chloride"..	0.27511	0.07164	—73.95	Not determined	
8	Auric chloride.....	0.20390	0.05338	—73.82	.....	.....

Experiments 6 and 7 were duplicates except as regards the time factor; in Experiment 7 the rate of percolation was reduced to 1 cc. per minute or less. The amount of reduction taking place was evidently considerable, for the filtrate appeared quite colorless, but was largely reoxidized by the air before the completion of the filtration. In Experiment 8 much of the gold retained by the filter formed a visible coating over the coke grains. In the writer's opinion the results are to be referred almost entirely, if not exclusively, to the sulphur compounds

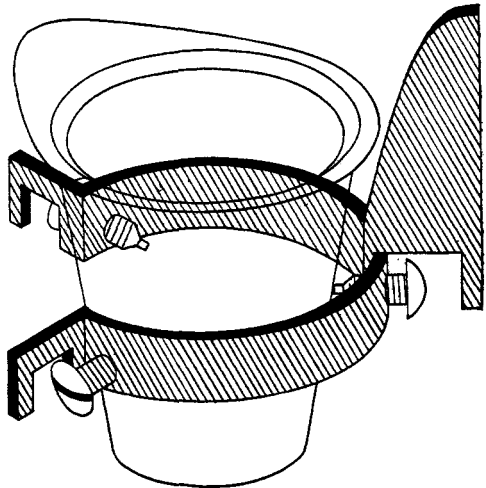
present in the coke. The effects of very slow percolation, such as is practiced when auricyanides are to be removed from solution by charcoal, is a question outside the scope of the present inquiry.

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### NOTE.

*A Substitute for Forceps and for Triangles in Desiccators; An Article for General Laboratory Use.*—It is possible to make, at small cost, a device combining the essential features of the more expensive platinum forceps and triangles and presenting advantages by virtue of which the manipulation of crucibles becomes at once easier and more certain, as less handling is necessary. Moreover, in transferring, the cover is never removed so that errors incident to that procedure are eliminated. When not in use as a transferring agent, the device remains in the desiccator and thus comes in contact with no undesirable foreign matter. The accompanying sketch shows a crucible in the holder.

A convenient size may be made from a strip of brass 9 mm. wide, 1.8 mm. thick, 140 mm. long, bent into the form of a ring with a consequent diameter of 45 mm. The same end may be attained more easily by the use of brass tubing of the proper dimensions. The free ends, which are to serve as two of the supports, are bent outward at right angles to the periphery, leaving an opening sufficiently wide to admit easily the more common sizes of crucibles. A handle of brass is riveted or soldered on the ring opposite the opening and extended in such a manner that a third support is formed. The lower edges of the three supports lie in the same plane. Three adjustable brass screws,  $120^\circ$  apart, pass through the ring near the lower edge, directed toward its center, one screw being immediately under the handle. The tips of the screws are bored to admit very short pieces of platinum wire, 1 mm. in diameter, and are then compressed to hold the latter in place. The device weighs approximately 25 grams.



As a substitute for the platinum triangle, the holder may be used in