with ether, both after drying. The highest rate was obtained after boiling with soda-lye; many samples being still non-absorbent after treatment with ether.

Treatment with the soda-lye even improved the absorbent power of the samples of "Absorbent Cotton" submitted for testing the rate being increased from three seconds for the dried, untreated cotton, to one second for that which had been treated.

Experiments were made on the absorptive capacity of the cotton, and in one case a six-gram sample of absorbent cotton was found to retain ninety-three grams of water or 15.5 times its own weight.

[CONTRIBUTION FROM THE JOHN HARRISON LABORATORY OF CHEMISTRY No. 8.]

REDUCTION WITH MAGNESIUM AMALGAM.

BY HERMANN FLECK AND LEWIS L. BASSETT.

Received August 21, 1895.

THE subject of neutral reducing agents has been taken up in a recent publication by J. B. Cohen and R. Ormandy.[1] The study of the same subject has been carried on in this laboratory during the past year. For this purpose magnesium amalgam, two per cent., was prepared in the following manner:

The required amount of mercury is placed in a small Hessian crucible and half covered with magnesium powder. The lid is put on loosely and the blast applied until a loud hissing noise begins. Once begun the reaction takes place by itself. This is repeated until the requisite quantity of magnesium powder has been added. A more uniform mass is obtained by boiling mercury in a hard glass tube, open at one end; then adding the magnesium in small quantities and shaking vigorously after each addition. The product is a silver white, crystalline, pasty mass which decomposes water with great energy and evolution of heat, and which upon exposure to air becomes covered with a black mass; probably a lower oxide of magnesium.

MAGNESIUM AMALGAM AND HYDROCYANIC ACID.

Two hundred cc. of ninety-six per cent. alcoholic solution of hydrocyanic acid containing eight grams of the acid were placed

[1] *Ber. d. chem. Ges.*, **27**, 1505.

in a liter distilling bulb connected to a condenser by a rubber tube. The condenser, by means of a long glass tube, led into a flask containing dilute hydrochloric acid, and this in turn was attached to a suction pump. After cooling in a mixture of ice and salt a small quantity of the amalgam was introduced into the neck of the distilling bulb, the cork replaced, and by a sharp jerk introduced into the liquid. When the theoretical amount of two per cent. amalgam had been introduced the contents were directly distilled into dilute hydrochloric acid evaporated to dryness, redistilled with addition of caustic soda into dilute hydrochloric acid, evaporated to dryness, and extracted with absolute alcohol. A small amount of ammonium chloride remained, produced by the action of hydrochloric acid upon the unconverted hydrocyanic acid.

The yield was fifteen per cent. 0.1122 grams methylamine platinichloride gave 41.08 per cent. platinum, the theory being 41.24 per cent. With more than the theoretical amount of amalgam a larger yield can surely be obtained.

MAGNESIUM AMALGAM AND BENZONITRILE.

Ten grams benzonitrile were dissolved in 200 cc. of ninety-six per cent. alcohol and twice the theoretical amount of amalgam added under the same conditions as above. The reaction product was filtered on a suction pump from the magnesium hydroxide formed and evaporated to dryness with hydrochloric acid, caustic soda added and extracted three times with ether. The ethereal solution was evaporated with hydrochloric acid to dryness and the residue extracted with absolute alcohol. There remained one gram of a crystalline substance melting under 100° C., whose alcoholic solution immediately reduced platinic chloride. This substance, possibly of a hydride nature, will be further investigated.

MAGNESIUM AMALGAM AND ACETOPHENONE.

Ten grams acetophenone were dissolved in fifty cc. ether and somewhat more than the theoretical quantity of amalgam added. When the mass cakes, alcohol is added and then sufficient water to completely decompose the amalgam. Dilute hydrochloric acid is added to dissolve the magnesium hydroxide formed, and

the semi-crystalline mass extracted with ether, the ethereal solution evaporated to dryness, crystals formed freed from oily substance by washing with ligroin, and recrystallized from benzene.

Of the products theoretically possible, acetophenone pinacone, or diphenyl dimethyl glycol, forms large colorless prisms, melting at 120° C. The product obtained melts at 120° C., and in every particular corresponds to the above. The yield was excellent.

It is our intention to further pursue the investigations with nitriles, ketones, oxynitriles, and amido-nitriles.

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TWO DEFINITE CARBIDES OF IRON WITH CHROMIUM (MOLYBDENUM AND TUNGSTEN).

BY JAMES S. DE BENNEVILLE

Received September 6, 1895.

A PREVIOUS paper[1] described in detail the results of a chemical examination of some ternary alloys of iron with chromium, molybdenum, and tungsten. In the course of the experiments there described two definite carbides were separated and it is proposed to give additional details obtained later. The physical description of the crystals is taken from Professor F. Lynwood Garrison's discussion of the paper cited.[2] The alloys described were made by taking pairs of the elements: tungsten chromium irons, molybdenum chromium irons, and molybdenum tungsten irons. The proportions taken were not based on equal weights but on quantities taken in the ratio of the atomic masses of the constituents. They were 1:1, 5:1, and 1:5. A lump of cast iron weighing fifty grams was imbedded in the mixture and melted, a white heat being maintained for an hour. The aggregations to be described were found in the chromium alloys and only in the two alloys (Nos. II and V) in which chromium was the predominant metal. These two alloys showed well individualized crystals differing in form and reactions from the matrix in which they were imbedded.

1 Iron and Steel Institute, May meeting, 1895.

2 *Ibid.* I take this opportunity of expressing my indebtedness to Professor Garrison, through whose kind offer I was enabled to present this paper to the council of the Institute.