Properties.—Colorless, oily liquid with an aromatic sweetish odor. Boiling point, 178–183°. It is miscible with the common organic solvents.

4-Methyloctane, $CH_3CH_2CH_2CH(CH_3)CH_2CH_2CH_2CH_2$, was prepared from 4-metheneoctane by reduction, the method being that of Sabatier and Senderens, wherein the unsaturated hydrocarbon was passed over freshly reduced nickel at a temperature of 160–180° in a stream of hydrogen. The process was exactly as that described by Clarke and Beggs[1] for the reduction of 2-methyl-5-metheneheptane to 2,5-dimethylheptane.

Twenty-one grams of 4-metheneoctane gave 19 grams of 4-methyloctane, which boiled at 141.7–141.9° at 771 mm. after a fractional distillation in which hardly a gram of hydrocarbon was rejected.

Subst., 0.1720; CO_2, 0.5334; H_2O, 0.2403.

Calculated for C_9H_{20}:	C, 84.37; H, 15.63.
Found:	C, 84.57; H, 15.62.

Properties.—Colorless, practically odorless, very mobil liquid. It boils at 141.7–141.9° under 771 mm. Its specific gravity at 15°, compared to water at 15°, is 0.7320 and its index of refraction as determined with the use of a Pulfrich refractometer, N_D (25°) = 1.4027.

I am deeply indebted to the C. M. Warren Fund for Research, a grant from which paid the expenses of this work.

CAMBRIDGE, MASS.

[CONTRIBUTION FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY No. 204.]

RESEARCHES ON QUINAZOLINES (THIRTY-FIRST PAPER). THE ACTION OF METHYL AND ETHYL IODIDES UPON 4-QUINAZOLONES.

BY MARSTON TAYLOR BOGERT AND GEORGE AUGUSTUS GEIGER.[2]

Received March 1, 1912.

But little information is on record concerning the action of alkyl iodides upon quinazolines.

Paal and Busch[3] heated 3-phenyldihydroquinazoline with methyl iodide for 2 hours at 100° and obtained an iodomethylate, another compound (apparently an isomeric iodomethylate), and an iodomethylate periodide.

Knape[4] heated a methyl alcohol solution of 3-methyl-4-quinazolone with methyl iodide in a sealed tube and obtained the iodomethylate. He also replaced the iodine by hydroxyl through contact with moist silver oxide.

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[1] THIS JOURNAL, 34, 59 (1912).

[2] Read at the Washington meeting of the Society, December 29, 1911.

[3] *Ber.*, 22, 2689 (1889).

[4] *J. prakt. Chem.*, [2] 43, 223 (1890).

Bischler and Barad,[1] by similar treatment of 2-methyl-4-phenylquinazoline, obtained an iodomethylate and an iodoethylate.

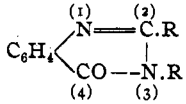
Paal and Neuburger[2] found that when *m*-aminophenyldihydroquinazoline, in methyl alcohol solution, was heated with excess of methyl iodide in a sealed tube for 12 hours, two molecules of methyl iodide were taken up: one by the quinazoline nucleus, the other methylating the amino group of the *m*-aminophenyl.

Gabriel and Colman,[3] working with quinazoline itself, discovered that the iodomethylate could be obtained in the cold or, more rapidly, by heating in a sealed tube, the methyl iodide attaching itself to the nitrogen at position 3. By the action of potassium hydroxide upon this iodomethylate, the corresponding methyl quinazolinium hydroxide was produced.

In the succeeding pages are recorded experiments with methyl and ethyl iodides on various 4-quinazolones, from which the following conclusions are drawn:

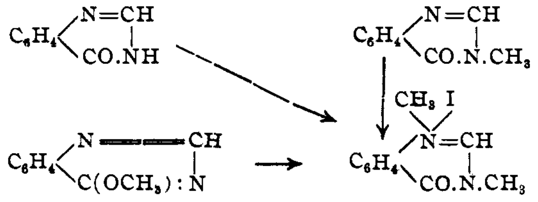
(1) 4-Quinazolones do not add alkyl iodides readily except under pressure and at temperatures of 110° or above.

(2) The iodide adds to the nitrogen in position 1, and not to that in position 3, since the compound obtained by adding methyl iodide to 2-methyl-3-ethyl-4-quinazolone is not the same as that obtained by adding ethyl iodide to 2,3-dimethyl-4-quinazolone. This is what was expected, as the nitrogen in position 1 is the more basic,—that in position 3, due to the adjoining CO group, being more amidic in character:



(3) The iodoethylates are more soluble in water, or in methyl alcohol, than the corresponding iodomethylates, and usually melt lower.

(4) By the action of methyl iodide alone, in excess, 4-quinazolone, 3-methyl-4-quinazolone and 4-methoxyquinazoline, all yield one and the same product, namely the iodomethylate of 3-methyl-4-quinazolone:



Whether the conversion of the 4-methoxyquinazoline into the iodo-

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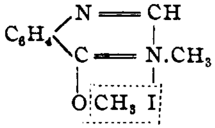
[1] *Ber.*, 25, 2082 (1892).

[2] *J. prakt. Chem.*, [2] 48, 563 (1893).

[3] *Ber.*, 37, 3651 (1904).

methylate of 3-methyl-4-quinazolone is or is not due to a preliminary addition of methyl iodide to the nitrogen in position 3, with subsequent splitting off again, thus



has not been determined as yet. It is hoped that further work will answer this question.[1] It is worth noting in this connection that, by the action of methyl iodide upon 2-methyl- or 2-styryl-4-quinazolone, the iodomethylates can be obtained without any methylation of the NH group in position 3.

(5) 6-Nitro-4-quinazolones generally refuse to combine with methyl or ethyl iodide.

(6) 2-Styryl-4-quinazolones add methyl iodide more easily than they do ethyl iodide. Styrylquinazolones carrying phenyl, *p*-anisyl, *p*-phenetyl or α-naphthyl radicals in position 3 do not add methyl iodide on 10 hours' heating at 150°. A *p*-tolyl radical in the same position does not seem to interfere.

(7) Generally these alkyl iodide addition products melt at high temperatures and soon thereafter evolve what in the cases tested proved to be the alkyl iodide. Occasionally, they remain in quiet fusion without any such effervescence.

(8) In some cases, the iodine can be replaced by the NO_3 group, by digesting the iodomethylate with silver nitrate.

The following new iodoalkylates of 4-quinazolones are described: iodomethylates of 2-methyl, 2,3-dimethyl, 3-ethyl, 2-methyl-3-ethyl, 3-benzyl, 2-methyl-3-phenyl, 2-methyl-3-*p*-tolyl, 2-methyl-3-*p*-anisyl, 2-methyl-3-*p*-phenetyl, 2-methyl-3-α-naphthyl, 2-methyl-3-β-naphthyl, 2-methyl-3-amino, 2-styryl, 2-styryl-3-methyl, 2-styryl-3-ethyl, 2-styryl-3-*p*-tolyl, 6-nitro-3-methyl, 2-phenylbutadienyl, 2-*m*-methoxy-*p*-hydroxystyryl; and iodoethylates of 3-methyl, 2,3-dimethyl, 3-ethyl, 2-methyl-3-ethyl, 2-methyl-3-phenyl and 2-styryl.

These iodoalkylates were analyzed by dissolving 0.2–0.3 gram of substance in water, adding a solution of silver nitrate acidified with nitric acid, and warming until the precipitated silver iodide settled. The precipitate was filtered through a Gooch crucible, washed carefully, dried at 110–20° and weighed. When the original substance was insoluble in water even on heating, sufficient alcohol was added to effect solution.

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[1] Compare Bogert and Seil, This Journal, 29, 517 (1907). Bogert and May, *Ibid.*, 31, 507 (1909). May, Dissert., Columbia Univ., 1908.

The preparation of the quinazolones used in the experiments will be found chiefly in previous papers from this laboratory.[1]

It is hoped to continue this line of study.

Experimental.

4-Quinazolone and Methyl Iodide.—4-Quinazolone was boiled with methyl iodide, alone or in methyl alcohol solution, but no formation of iodomethylate could be detected. It became necessary, therefore, to carry out the reaction under pressure.

Three grams of the quinazolone and slightly more than an equimolecular amount of methyl iodide were heated together in a sealed tube for 7 hours at 100°. On opening the tube, there was slight pressure evident. The red, crude product was purified by repeated crystallization from methyl alcohol and was thus obtained in small crystals, of faint yellowish tinge, melting at 273–4° (cor.). Yield, 20%. The substance was soluble in water or in alcohol, difficultly soluble or insoluble in ether, chloroform, acetone or benzene.

Another tube was run with two molecules of methyl iodide to one of the quinazolone. The tube contents at the close of the heating possessed a peculiar penetrating odor. The purified product was colorless, melted at 273° (cor.), and was identical with that secured in the first experiment. Yield, 50%.

Calculated for $C_{10}H_{11}ON_2I$: N, 9.27; I, 42.04.
Found: N, 9.28; I, 41.99.

The product is thus an iodomethylate of a methylquinazolone, and is identical with the iodomethylate obtained from 3-methyl-4-quinazolone or from 4-methoxyquinazoline, as a mixture of any two, or of all three, showed the same melting point, and the crystals appeared the same under the microscope.

4-Methoxyquinazoline and Methyl Iodide.—That these substances react to form an iodomethylate has been shown by May.[2] He gives the melting point of the product as 265° (cor.), and his analysis corresponds to that of an iodomethylate of a methylquinazolone. We have repeated the work and find that the product is the iodomethylate of 3-methyl-4-quinazolone and that when carefully purified it melts at 274° (cor.).

This reaction goes on slowly when cold, and the product is conveniently purified by crystallization from methyl alcohol.

4-Methoxyquinazoline and Ethyl Iodide—Two grams of the quinazoline were heated with the calculated amount of ethyl iodide for several hours at 100°, and the crude product crystallized from methyl alcohol. Fine

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[1] Bogert, Beal and Amend, This Journal, 32, 1654 (1910). Bogert and Beal, *Ibid.*, 34, 516 (1912). Bogert and Geiger, *Ibid.*, 34, 524 (1912).

[2] *Loc. cit.*

colorless needles were thus obtained, melting at 249° (uncor.), insoluble in cold water. Yield, 1 gram.

Found: I, 40.90, 40.90; N, 9.42.

These figures do not check with those calculated for the compound expected, and the substance has not yet been identified.

2-Methyl-4-quinazolone and Methyl Iodide.—The quinazolone was boiled for 7 hours with excess of methyl iodide, but no change occurred. A solution of the quinazolone and methyl iodide in methyl alcohol was then boiled for 4 hours with the same result.

When the quinazolone and methyl iodide were heated together at 150° in a sealed tube, the result was a reddish crystallin cake. This cake was dissolved in cold methyl alcohol (in which it is very easily soluble), a few drops of ether added (not sufficient to cause precipitation), and the mixture cooled to —10°. Well-formed crystals separated, and additional crops were secured by treating the mother liquors similarly. The crude substance melts at 220° (uncor.). Yield, poor.

Calculated for $C_{10}H_{11}ON_2I$:	N, 9.27; I, 42.04.
Found:	N, 9.47; I, 42.05.

A similar product was obtained when two molecules of methyl iodide were used to one of the quinazolone.

In another experiment, at 100°, the product separated as a pale yellow amorphous solid, but its melting point (220°) and analysis showed it to be the same as the above:

Found: N, 9.20; I, 42.18.

The pure compound forms grayish prisms, soluble in water, methyl or ethyl alcohols; difficultly soluble or insoluble in ether, chloroform, benzene or acetone.

3-Methyl-4-quinazolone and Methyl Iodide.—Knape[1] prepared this iodomethylate by heating a methyl alcohol solution of the quinazolone and methyl iodide in a sealed tube for an hour at 100°. If the methyl alcohol be omitted in the preparation, the yield is then nearly theoretical.

The product crystallizes from methyl alcohol in colorless prisms, melting at 274° (cor.). Knape gives no melting point for his product, while May, who also prepared it, gives it as 263°.

Calculated for $C_{10}H_{11}ON_2I$:	N, 9.27; I, 42.04.
Found:	N, 9.44; I, 42.19.

3-Methyl-4-quinazolone and Ethyl Iodide.—An equimolecular mixture of the two was heated in a sealed tube for 2 hours at 110°. The crude product was recrystallized from methyl alcohol, giving clusters of pale yellowish prisms, melting with effervescence at 230° (cor.). Yield, 40%. The compound is much more soluble in hot water than the isomeric 3-ethyl-4-quinazolone iodomethylate.

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[1] *Loc. cit.*

Calculated for $C_{11}H_{13}ON_2I$: N, 8.86; I, 40.17.
Found: N, 9.14; I, 40.13.

2,3-Dimethyl-4-quinazolone and Methyl Iodide.—This quinazolone when boiled with methyl iodide failed to yield any iodomethylate, so 3 grams of it were heated with the calculated amount of methyl iodide in a sealed tube for 7 hours at 100°. The product crystallized from methyl alcohol in fine colorless crystals which, after three recrystallizations, melted at 245° (cor.). Yield, 90%.

Calculated for $C_{11}H_{13}ON_2I$: N, 8.86; I, 40.17.
Found: N, 9.01; I, 40.40.

It is soluble in water or benzene, very slightly soluble (yellow solution) in acetone, apparently insoluble in ether.

2,3-Dimethyl-4-quinazolone and Ethyl Iodide.—The two were heated together under exactly the same conditions as for the 2-methyl-3-ethyl-4-quinazolone and methyl iodide described beyond. At the close of the heating, the tube contained a mass of fine reddish crystals. Recrystallized from methyl alcohol, colorless glassy needles resulted, melting at 242° (cor.).

Calculated for $C_{12}H_{15}ON_2I$: N, 8.48; I, 38.46.
Found: N, 8.84; I, 38.49.

3-Ethyl-4-quinazolone and Methyl Iodide.—Three grams of the quinazolone were heated with excess of methyl iodide for 2 hours at 110°. The product crystallized from methyl alcohol in thin colorless scales of satiny luster, melting with effervescence at 258° (uncor.); soluble in water or alcohol; difficultly soluble or insoluble in cold water, in acetone, chloroform, ether or benzene. Yield, 3.1 grams.

Calculated for $C_{11}H_{13}ON_2I$: N, 8.86; I, 40.17.
Found: N, 9.13; I, 40.10.

3-Ethyl-4-quinazolone and Ethyl Iodide.—The two were heated together for 2 hours at 110° and the crude product purified by careful crystallization from a mixture of methyl alcohol and ether. The pure substance forms fine, short, pale yellowish needles, melting at 181° (cor.); soluble in water, methyl or ethyl alcohol, acetone, chloroform or benzene; practically insoluble in ether. Yield, 4.5 grams from 2.75 grams of the quinazolone.

Calculated for $C_{12}H_{15}ON_2I$: I, 38.46.
Found: I, 38.51.

2-Methyl-3-ethyl-4-quinazolone and Methyl Iodide.—Two grams of the quinazolone and slightly more than the calculated amount of methyl iodide were heated together in a sealed tube for 4 hours at 110°. The tube then contained a crystallin yellow mass and slight pressure was evident on opening it. The solid material was crystallized from methyl alcohol, in which it is more soluble than the iodomethylate of 2,3-dimethyl-4-quinazolone. As thus recrystallized, it forms rosets of small, colorless crystals, which melt with effervescence at 220° (cor.).

Calculated for $C_{12}H_{15}ON_2I$: N, 8.48; I, 38.46.
Found: N, 8.63; I, 38.24.

2-Methyl-3-ethyl-4-quinazolone and Ethyl Iodide.—An equimolecular mixture of the two was heated for 2 hours at 110°. The tube then contained a deep red liquid in which were a few crystals. On concentration, this liquid gave a viscous mass, readily dissolving in methyl alcohol or in acetone, but giving no good crystals on cooling. By careful addition of ether to the methyl alcohol solution, a pale yellow pulverulent solid precipitated, melting sharply at 177° (cor.), which appears to be the iodoethylate sought. Yield, very poor. The compound is readily soluble in water.

Calculated for $C_{13}H_{17}ON_2I$: I, 36.90.
Found: I, 37.11.

3-Benzyl-4-quinazolone and Methyl Iodide.—Three grams of the quinazolone and the calculated amount of methyl iodide were heated together for an hour at 110°, and the crude product purified by crystallization from alcohol. Yield, 3.3 grams. The pure substance forms minute, cream colored crystals, melting at 188° (cor.); soluble in water or chloroform; difficultly soluble in acetone; practically insoluble in ether or benzene.

Calculated for $C_{16}H_{15}ON_2I$: I, 33.58.
Found: I, 33.48.

2-Methyl-3-phenyl-4-quinazolone and Methyl Iodide.—A mixture of 2 grams of the quinazolone and the calculated amount of methyl iodide was heated in a sealed tube at 110°, and the crude product crystallized from methyl alcohol, from which it separated in short needles, partly united in clusters or rosettes, and melting with effervescence at 243° (cor.). Yield, 90%.

Calculated for $C_{16}H_{15}ON_2I$: N, 7.40; I, 33.58.
Found: N, 7.54; I, 33.50.

2-Methyl-3-phenyl-4-quinazolone and Ethyl Iodide.—An equimolecular mixture of the two was heated in a sealed tube for 2 hours at 110°. The crystallin product was too easily soluble in methyl alcohol, so it was crystallized from acetone, from which it separated in minute, colorless crystals, melting at 244° (cor.). Yield, not very good.

Calculated for $C_{17}H_{17}ON_2I$: I, 32.38.
Found: I, 32.49.

2-Methyl-3-p-tolyl-4-quinazolone and Methyl Iodide.—The quinazolone and methyl iodide were heated together in a sealed tube for 3 hours at 110°, and the product crystallized first from methyl alcohol and then from ethyl alcohol (to remove a small amount of reddish impurity). Yield, 80%. The pure compound forms pale yellowish plates of satiny luster, melting with effervescence at 234.5° (uncor.); soluble in water, methyl or ethyl alcohol.

Calculated for $C_{17}H_{17}ON_2I$:	I, 32.38.
Found:	I, 32.17.

2-Methyl-3-p-anisyl-4-quinazolone and Methyl Iodide.—An equimolecular mixture of the two was heated in a sealed tube for 3 hours at 116°, and the product crystallized from methyl alcohol, yielding colorless nacreous scales, melting with effervescence at 231.5° (cor.); soluble in water, methyl or ethyl alcohol; difficultly soluble or insoluble in ether, chloroform, acetone or benzene. Yield, 3 grams from 2.5 grams of the quinazolone.

Calculated for $C_{17}H_{17}O_2N_2I$:	I, 31.11.
Found:	I, 31.01.

2-Methyl-3-p-phenetyl-4-quinazolone and Methyl Iodide.—A mixture of the quinazolone with excess of methyl iodide was heated for 3 hours at 110° and the product crystallized from methyl alcohol. Small, pale yellowish crystals were obtained, melting with effervescence at 221° (uncor.); soluble in water, methyl or ethyl alcohol; difficultly soluble or insoluble in ether, chloroform, acetone or benzene.

Calculated for $C_{18}H_{19}O_2N_2I$:	I, 30.07.
Found:	I, 30.05.

2-Methyl-3-α-naphthyl-4-quinazolone and Methyl Iodide.—A mixture of the quinazolone and methyl iodide was heated in a sealed tube for 3 hours at 110°, and the product crystallized from methyl alcohol. Minute, pale yellowish needles resulted, melting with effervescence at 235° (uncor.); soluble in water, methyl or ethyl alcohol; difficultly soluble or insoluble in ether, chloroform, acetone or benzene. Yield, 2 grams from 3 grams of the quinazolone.

Calculated for $C_{20}H_{17}ON_2I$:	I, 29.65.
Found:	I, 29.73.

2-Methyl-3-β-naphthyl-4-quinazolone and Methyl Iodide were heated together for 3 hours at 120° and the product, on crystallization from methyl alcohol, gave microscopic, pale brown needles, melting with effervescence at 238° (uncor.), and showing approximately the same solubilities as the α-compound. Yield, theoretical.

Calculated for $C_{20}H_{17}ON_2I$:	I, 29.65.
Found:	I, 29.80.

2-Methyl-3-amino-4-quinazolone and Methyl Iodide.—Attempts to methylate the amino group in this quinazolone either by the action of methyl iodide, or of dimethyl sulfate, in presence of alkali, failed, the quinazolone being recovered unaltered. By the action of methyl iodide alone, however, a monoiodomethylate was obtained.

A mixture of the quinazolone and methyl iodide was heated for an hour at 110°. Longer heating caused considerable decomposition. The crude product crystallized from methyl alcohol in minute, pale brownish prisms, melting with effervescence at 201° (cor.), and showing similar solubilities to the above naphthyl derivatives. Yield, 2 grams from 3 grams of the quinazolone.

Calculated for $C_{10}H_{12}ON_3I$: I, 40.04.
Found: I, 39.93.

2-Styryl-4-quinazolone and Methyl Iodide.—The addition of the methyl iodide was accomplished by 2 hours' heating at 110°. The product crystallized from methyl alcohol in short, feathery, golden yellow needles, which began to melt at 230° and gave a clear liquid fusion at 235° (uncor.), but, unlike the iodomethylates described above, did not show any effervescence. Yield, 2.5 grams from 3 grams quinazolone. The substance is difficultly soluble in hot water, soluble in methyl or ethyl alcohol, very difficultly soluble or insoluble in ether, chloroform, acetone or benzene.

Calculated for $C_{17}H_{15}ON_2I$: I, 32.54.
Found: I, 32.43.

2-Styryl-4-quinazolone Methyl Nitrate, $C_{16}H_{12}ON_2.CH_3NO_3$.—In the analysis of the preceding compound, the iodine was precipitated as usual with silver nitrate and the silver iodide filtered out. From the filtrate, on cooling, there separated fine, pale yellowish needles, melting with effervescence at 177° (cor.), which proved to be the corresponding methyl nitrate addition product, the iodine having been replaced by the nitric acid residue. Yield, theoretical.

Calculated for $C_{17}H_{15}O_4N_3$: N, 12.92.
Found: N, 12.96.

2-Styryl-4-quinazolone and Ethyl Iodide.—No addition occurred when these substances were heated together for 3 hours at 110°, and it was found necessary to heat 10 hours at 140° to accomplish the desired result. The iodoethylate crystallizes from methyl alcohol in small, feathery, orange yellow needles, which melt at 217–8° (uncor.) without effervescence. It is difficultly soluble in hot water, much more soluble in methyl alcohol than the corresponding iodomethylate, moderately soluble in acetone or chloroform, and practically insoluble in ether or benzene. Yield, 1.5 grams from 3 grams quinazolone.

Calculated for $C_{18}H_{17}ON_2I$: I, 31.41.
Found: I, 31.45.

2-Styryl-3-methyl-4-quinazolone and Methyl Iodide.—An equimolecular mixture of the two was heated 4 hours at 110° in a sealed tube. The solid product was crystallized from methyl alcohol, and then appeared in bright, lemon yellow scales, melting with effervescence at 214° (cor.); soluble in a large volume of hot water. Yield, 80%.

Calculated for $C_{18}H_{17}ON_2I$: N, 6.93; I, 31.41.
Found: N, 7.19; I, 31.49.

2-Styryl-3-methyl-4-quinazolone heated with excess of ethyl iodide for 3 hours at 115°, or for 5 hours at 130–40°, yielded no iodoethylate, but remained unchanged.

2-Styryl-3-ethyl-4-quinazolone and Methyl Iodide were heated together for 2 hours at 115° in a sealed tube. The crude product crystallized from methyl alcohol in pale yellow, glistening plates, melting with effervescence at 207.5° (uncor.); difficultly soluble in water, but much more readily soluble in methyl alcohol than the 2-styryl-3-methyl-4-quinazolone iodomethylate. Yield, 30%.

Calculated for $C_{19}H_{19}ON_2I$: I, 30.36.
Found: I, 30.46.

2-Styryl-3-p-tolyl-4-quinazolone and Methyl Iodide.—A mixture of the two was heated for 3 hours at 110° without any change occurring, and it was necessary to heat for 10 hours at 140° to effect the addition. The product crystallizes from methyl alcohol in clusters of beautiful golden yellow needles, melting with effervescence at 219.5° (uncor.); difficultly soluble in water; more soluble in methyl alcohol than the iodomethylate of 2-methyl-3-*p*-tolyl-4-quinazolone; soluble in ethyl alcohol; difficultly soluble or insoluble in ether, chloroform, acetone or benzene.

Calculated for $C_{24}H_{21}ON_2I$: I, 26.50.
Found: I, 26.49.

The following 4-quinazolones failed to add methyl iodide when heated with it for 10 hours at 140°: 2-styryl-3-phenyl, 2-styryl-3-*p*-anisyl, 2-styryl-3-*p*-phenetyl and 2-styryl-3-α-naphthyl.

6-Nitro-3-methyl-4-quinazolone and Methyl Iodide.—Six grams of the quinazolone were heated with methyl iodide in a sealed tube for 6 hours at 130°. The crude product crystallized from methyl alcohol in clusters of orange needles, melting sharply at 228.5° (cor.). Yield, 5 grams.

Found: N, 15.80, 15.90; I, 23.36, 23.43.

This corresponds to a compound made up of one molecule of the original quinazolone in union with one molecule of its iodomethylate (N, 15.21; I, 23.0). Under the microscope, the crystals appeared homogeneous. When this substance was crystallized from water, there separated first some of the original quinazolone, then the orange needles just described, and finally the iodomethylate sought.

The latter crystallizes in small, yellow needles, melting sharply at the same point as the orange compound (228.5°, cor.).

Calculated for $C_{10}H_{10}O_3N_3I$: I, 36.58.
Found: I, 36.19.

The following nitro 4-quinazolones refused to add methyl iodide under the conditions of our experiments: 6-nitro-2-methyl, 6-nitro-2,3-dimethyl and 6-nitro-2-methyl-3-ethyl.

2-Phenylbutadienyl-4-quinazolone and Methyl Iodide were heated together for 3 hours at 120°. The crude product crystallized from methyl alcohol in minute, salmon crystals, melting with slight effervescence at 232.5° (cor.); insoluble in water, but soluble in dilute ethyl alcohol. Yield, 1 gram from 2 grams quinazolone.

Calculated for $C_{19}H_{17}ON_2I$: I, 30.51.
Found: I, 30.43.

2-m-Methoxy-p-hydroxystyryl-4-quinazolone and Methyl Iodide were heated together for 3 hours at 120°. The crude product crystallized from methyl alcohol in salmon red, microscopic crystals, melting quietly at 223-5° (uncor.); difficultly soluble in water, but soluble in dilute alcohol. Yield, 2.5 grams from 2 grams quinazolone.

Calculated for $C_{18}H_{17}O_3N_2I$: I, 29.11.
Found: I, 28.82.

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NEW YORK CITY.

[CONTRIBUTION FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY
NO. 206.]

p-AMINOBENZONITRILE AND CERTAIN OF ITS DERIVATIVES.

[THIRD PAPER.][1]

BY MARSTON TAYLOR BOGERT AND LOUIS ELSBERG WISE.

Received March 18, 1912.

In continuing the work on *p*-aminobenzonitrile previously reported[2] from this laboratory, the authors have prepared and studied the following new compounds: *p*-aminobenzonitrile picrate, *p*-nitrobenzoyl-*p*-aminobenzonitrile, *p*-cyanophenyl urethane, *p*-carbamidophenyl urethane, *p*-cyanphenyl urea, *p*-cyanocarbanilide, di-*p*-cyanocarbanilide, *p*-cyanoxanilamide, oxanilic *p*-cyananilide, *p*-cyanosuccinanilic acid, its silver salt, methyl and ethyl esters, *p*-cyanosuccinanil, *p*-cyanophthalanilic acid, *p*-cyanophthalanil, a formaldehyde condensation product, bromo-*p*-acetaminobenzonitrile, 3-nitro-4-acetaminobenzamide, 3,4-diacetyldiaminobenzonitrile, cyano-α-methylbenzimidazole and the corresponding carbamidomethylbenzimidazole.

Of these compounds, the picrate was obtained by bringing the nitrile and picric acid together in benzene solution; the *p*-nitrobenzoyl derivative, by the action of *p*-nitrobenzoyl chloride upon the nitrile in presence of pyridine. From the aminonitrile and ethyl chlorformate, the cyanophenyl urethane was obtained, whose CN was hydrolyzed to a $—CO.NH_2$ group by the action of an alkalin solution of hydrogen dioxide. *p*-Cyanophenyl urea could not be prepared from the urethane and ammonia, but was obtained from the hydrochloride of the nitrile and potassium cyanate. From the aminonitrile and phenyl isocyanate, the *p*-cyanocarbanilide resulted; and, with phosgene, the di-*p*-cyanocarbanilide.

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[1] Read at the Washington Meeting of the Society, Dec. 29, 1911.

[2] THIS JOURNAL, **25**, 478 (1903); **32**, 1494 (1910).