The acid was diluted to one-fifth its former strength or eight hundredths of one per cent. I now adopted the following way of operating: A convex cover was placed on a water bath, the water in which was heated to boiling; each piece of paper as dipped was laid on the upper convex surface of the cover; this dried it in about one minute; in practice this will be found an excellent way of using the paper.

The standard paper dipped once and dried showed the reaction, but not strongly; a second dipping and drying brought it out perfectly; a third treatment made the reaction still stronger.

When a paper colored by this weak acid was dipped a second time the previous change of color was indiscernible until it had dried again.

The acid was reduced to four-hundredths of one per cent.; the paper just showed the reaction after one dipping and drying; a second treatment developed it perfectly.

The acid was next reduced to two hundredths of one per cent. strength; the reaction appeared after three to five treatments but very faintly.

About the same results were obtained with sulphuric acid of corresponding strengths.

The series of experiments indicates pretty closely the limits of sensitiveness; drying the paper cannot be too strongly insisted upon; independent of any concentration of acid thus effected, the color change which is masked to a great extent by moisture is made visible by drying.

IX. DIPHENYLAMINE—ACROLEIN.

By Albert R. Leeds.

25 grms. of diphenylamine, in alcoholic solution, were treated with acrolein in excess, and after standing, the loosely-corked flask was gently warmed for a number of hours, until the smell of acrolein had nearly disappeared. A bulky dark red precipitete was formed. On boiling with alcohol a deep red solution was obtained and the portion undissolved formed a tenacious sticky mass, very awkward to work with. By repeated boiling with water under a return cooler this mass gradually lost its sticky nature. It was then digested alternately with boiling water and alcohol, until at last the mass became pulverulent and could be ground up in a mortar. The operation of boiling was then repeated many times, the

mass being powdered after each treatment with water, until at length the substance in a state of purity was obtained. Its analysis showed it to be Diphenylamine–Acrolein or, as it might be termed Didiphenylamineallyline, $(C_{12}H_{10}N_2)C_3H_4$.

	Found	Theory
Carbon,	86.26	86.18
Hydrogen,	6.29	6.36
Nitrogen,	7.28	7.45

It does not melt or sublime but is decomposed on breaking, leaving behind a carbonaceous residue extremely difficult of combustion. It is very slightly soluble in alcohol, insoluble in ether, and readily soluble in chloroform to a dark red liquid. From this solution, and also from that in glacial acid, in which it dissolves to a red liquid, but less readily than in chloroform, it could not be made to crystallize.

Its solution in chloroform was attacked with great energy by bromine. So also its solution in acetic acid, a dark red compound being formed on the addition of two atoms of bromide to one molecule of the diphenylamine. This compound was readily soluble in chloroform, but as it did not separate in a crystalline condition its anlaysis was not made. It was probably the addition compound $(C_{12}H_{10}N_2)C_3H_4Br_2$.

Its solution in acetic acid was attacked by nitric acid, forming a precipitate with a supernatant yellow liquid. Neither the solution or the precipitate yielded a crystallizable nitro-product, and their study was abandoned.