Aniline Colors.

Dr. M. Reman, of Berlin, Prussia, whose name is already known to the reader as a prominent savant in the field of industrial arts, contributes the following upon the above interesting topic.

The beginning of this decennium is marked by a general change in all departments of the art of dyeing. Instead of the coloring matters previously in use, and which had been extracted from wood and bark, it was attempted to employ those coloring matters that had recently been prepared from aniline, and the most perfect success attended this innovation.

The coloring substances obtained from aniline are decidedly preferable to those extracted from woods, barks, etc., by reason of their substantial character; that is to say, the fibers do not require the use of mordants before being dyed. Thus, neither wool nor silk requires to be mordanted before they are dyed. In aniline colors, since these latter are capable of dyeing material without any previous preparation of the animal fiber. According to the old method, when dying with logwood, redwood, cochineal, etc., it was always necessary to impregnate the fiber which was to be dyed with that mordant which, by combining with the pigment of the coloring matter, would cause it to adhere to the fiber; for those coloring matters become pigments only by combining with the mordants that are employed. Aniline colors, however, being true pigments, is unnecessary to employ mordants with them.

The aniline color is, as chemists say, always a salt; when it is dissolved, the animal fiber precipitates the salt, and is dyed by it. Therefore, whenever animal fiber is dipped into such a solution, the coloring matter adheres to the fiber. According as the fiber is allowed to remain a longer or shorter time in the bath, brighter or darker shades are obtained. Hence from a single bath, every shade of a color may be produced—a thing which was utterly impossible with the pigments formerly employed.

Aside from this great advantage, these aniline colors sparkle with a brilliancy that no other colors ever show. To this fact is due the extensive application of these colors in the manufacture of ladies' articles.

Who, ten short years ago, could have dreamed of a blue or violet such as is now daily produced in our dyeing establishments? Today, however, the sparkling colors of birds and flowers are fixed on our textile fibers. Chemists have even discovered that the brilliant colors of many flowers are aniline colors, produced in the plant by nature. Thus in the dahlias has been found an aniline color, which is known in commerce by the name of "Hoffman's violet," and M. Ziegler has shown that a colored liquid, consisting of a solution of an aniline color, is contained in some cochans found on the shores of Spain. After this, it can not be exerted astonishment that the aniline pigments are now of the greatest importance to dyers, who could not now exist without them. Especially the grays that are now in fashion are always prepared by aniline colors. Even in dyeing cloth, a reddish gray is frequently produced by treating the cloth in an aniline bath, after it has received the usual gray color. In a similar manner the violet shades of some cloths are produced.

Aniline colors are employed to as great an extent for dyeing cotton as for the materials already mentioned—wool and silk. The difficulties to be surmounted are, however, far greater in the case of cotton. Vegetable fibers will not take the colors from the bath unless it is previously prepared.

Animal fibers, when compared with vegetable fiber, possesses the advantage of containing nitrogen; and every substance that contains nitrogen can fix aniline colors. It was therefore deemed advisable by dyers to cover the vegetable fiber, which lacks nitrogen, with some substance containing this element. Then the substance containing the nitrogen will attract the aniline color, and through it as a medium the aniline color will be fixed on the cotton or any other vegetable fiber. The nitrogenuous substances were taken from animals, and hence the process of covering the vegetable fiber with an animal substance was called "animalizing." The albumen of eggs and of blood, as also the casein from milk, while in solution, were brought into contact with the fiber, and when this was thoroughly impregnated with the animal solution, the albumen or casein was by some chemical process rendered insoluble, and thus was fixed on the fiber. For instance, to cover cotton with the albumen of eggs, the latter substance was diluted with water; and the cotton impregnated with it in a diluted state. The cotton was then dyed, put into an apartment filled with steam. Since the temperature of steam under ordinary pressure is 212° Fahrenheit—80° Celsiar—100° Celsiar, and the albumen coagulated at 70° to 80° Celsiar, the albumen of course became insoluble after a short time, as it assumed the temperature of the steam. The cotton could then be washed with either hot or cold water, without any danger of its losing a particle of albumen.

Casein is dissolved in ammonia, and the alkaline solution of the animal product thus obtained was employed to impregnate cotton or any other fiber that was devoid of nitrogen. Now, casein, though readily dissolved in alkaline liquids, is insoluble in acids, and it can, therefore, be precipitated from its alkaline solution by the addition of any acid. The dyers, accordingly, in order to fix the casein, dipped the cotton impregnated with the alkaline solution of casein in an acid bath, and the casein was instantly precipitated on the fiber by the acid. In such a similar manner, any animal substance was fixed on the vegetable fiber; and this process is still employed in the printing of cotton. The animal substances spoken of are, however, too expensive for ordinary use; hence the dyers were soon obliged to resort to other mordants for fixing the aniline colors on vegetable fiber.

In preparing Adriamphol red, an alkaline solution is employed, in which oil is divided into excessively fine drops, so fine, in fact, that the liquid looks like milk, which is also a colorless liquid, rendered non-transparent by small drops of fat, or butter. A similar fluid is obtained by mixing oil, alcohol, and sulphuric acid; it is known to dyers by the name of "oil mordant," and has the property of enabling the cotton to take up and fix the aniline colors. The above-mentioned mixture may conveniently be diluted with
water, and employed to impregnate the cotton, which
will then take up and fix the mordant colors when dip-
ped in a warm solution of these pigments. It was
soon discovered that other substances containing fat
might serve as mordants for aniline colors. Thus
soap, and especially barred, or Dutch soap, when dis-
solved in water, fixes the aniline pigments on the cot-
tton. This kind of soap is so cheap that it may be em-
ployed even for the cheapest cotton articles. It is ne-
necessary merely to put the cotton into a solution of
Dutch soap, to wring the cotton, and to dye it
immediately in a warm bath of any aniline color.
Another substance used for fixing aniline colors is
tannin or tannic acid, which, as is generally known,
is contained in gall nuts and other astringents. A
solution of gall nuts or sumac, boils in water, and
the cotton is allowed to remain in the clear solution
for from twelve to twenty-four hours. The cotton is
then taken out, wrung, and dyed as usual in a warm
bath of any aniline color.

Some and soap are, at present, the materials most
frequently employed for fixing aniline colors on vege-
table fiber. As aniline colors are affected by the in-
fluence of the atmosphere and by soap, dyers frequently
dye the cotton, at first, with the coloring matters for-
merly employed, and then also with the corresponding
aniline color. Thus, aniline blue on cotton is, in its
darker shades, always grounded with Prussian blue.
The very slight effect of aniline pigments is of great
importance to the dyer. It is true that they are dear
enough, and formerly were still more so. But then,
they are, beyond all comparison, more intense than the
coloring matters formerly employed. Thus, one pound
of mordants will dye 200 pounds of wool in quite a
depth red shade. Could a pound of any of the old pig-
ments have sufficed for such a quantity of material?
The other aniline pigments have a similar intensity;
so that, besides the increase in brilliancy, it is also eco-
nomical to employ the new colors. In addition to all
these advantages, the dyer can, with greater ease, pro-
duce shades after a given pattern with these colors.
The pigment in solution looks exactly as the color
produced by it on the fiber. Formerly the dyer was
required to prepare a color which did not yet exist;
now he procures it from the manufacturer. He chooses
the shade which is to be produced, and can never fail,
as was formerly the case when he was obliged to pro-
duce the color from the bath. How tedious were the
former processes of sedimenting, washing, hanging,
drying, etc.? Now minutes suffice for that labor which
previously required days.

It has been objected to the employment of an-
iline colors that they are unstable. This is true. But
it may be observed that they are scarcely possible for such
brilliant colors as the aniline pigments to be stable.
The sparkling violet, the brilliant red, and
light-blue, as magenta, etc., can never bear the in-
fluence of the atmosphere, dust, acid, vapors, etc.
These of the formerly employed pigments that are still
approached in brilliancy these aniline colors are fully
as unstable as they. One need only mention the old
blacks, that violet pigment which, though by no means
improving as fresh and sparkling shades as aniline
violet, in almost as unstable. The red, violet, and
blue colors produced by woods and other similar sub-
stances for dying were fully as fleeting as the aniline
pigments. Even black, which is usually regarded as a
firm color, is one of the most unstable ones. In fact,
the black, as it is generally produced by logwood and
tannin, is so liable to change, that acid, vapors, or
atmospheric influences are sufficient to make it disap-
ppear. The true reason why the black on cloths and
these materials requires, at least, to be durable, is, that
it lies on a surface of the most stable of all coloring
matters—indigo. The black color of cloth and other
excellent stuffs is produced by first dying the goods
dark blue in the warm indigo vat. This is an expen-
sive and uncomfortable process, but necessary for a