CHEMICAL PRODUCTS AT THE VIENNA EXHIBITION.

A NEW coloring matter, derived from aniline, and discovered between 1869 and 1873, is saffranine. This fine color, now manufactured on a large scale, and much used in silk dyeing, is a very pure and brilliant red, verging upon scarlet. It is a derivative of toluidine, and is prepared by treating heavy aniline oil, boiling between 386° and 397° F. with nitrous acid or nitrites. A mixture of nitrogenized bodies is thus obtained, and is oxidized by means of arsenic acid, bichromate of potash, sulphuric acid, etc. Crude saffranine is purified by taking advantage of its solubility in dilute alkaline liquids. It is now sold as muriate in the form either of a paste or of a crystalline powder. The finest sorts are manufactured by Lotz, Durand, and Huguenin, and Geigy, of Bâle, and Poirier, of Paris.

All the salts of saffranine exhibit the following characteristic reaction, which distinguishes them readily from the salts of rosaniline. If sulphuric acid is added to solutions of saffranine, their red-brown color becomes successively violet, deep blue, deep green, and finally light green; an addition of water gradually changes the colors in the opposite order. Magenta, on the contrary, is turned yellow by sulphuric acid, and water restores the red shade.

Among the number of aniline colors, we may further mention the following: Phosphine (doubtless a salt of chrysani-line or chrysotoluidine), which dyes a fine orange; palatine orange, prunine brown, induline, Coupier's blue. This last, prepared apparently from the residues of the manufacture of blue, finds a very extended use in wool-dyeing as a substitute for indigo.

Kopp and Gnehm have prepared a splendid orange coloring matter, hexanitrediphenylamine, by the action of concentrated nitric acid upon methyl diphenylamine, and still better upon diphenylamine. It forms very fine crystalline salts, soluble in water and ammonia. Its soda and potash salts dye silk and wool fine reddish-orange shades, very brilliant, and possessing a certain dichroism. The preparation and use of this coloring matter are rendered very difficult, in consequence of its violent blistering action.

(b) *Naphthaline Colors.*—Naphthaline and its derivatives are capable of yielding many dyes, but few of them have been permanently introduced into commerce; these are the brown, the violet, and the naphthylamine garnet of Courtois, the yellow of Martius, and naphthaline rose, or Magdala rose. The yellow of Martius, known also as naphthylamine yellow, or Manchester yellow, and sometimes incorrectly called aniline yellow, may be prepared by different methods. It is made according to Martius, by the action of nitric acid upon azodi, naphthylamine, a product of the reaction of nitrite of potassa, soda, or lime upon the muriate of naphthylamine; or, according to Ballo, by the direct action of nitric acid upon naphthylamine, or, lastly, according to Darmstedder and Wichelhaus, by nitrating the naphthol prepared by means of naphthylsulphurous acid or sulphonaphthalic acid. It is one of the finest and most solid yellows which we possess, and dyes wool and silk without mordant, all shades, from the lightest lemon to a gold-yellow. It is chiefly used for dyeing wool and leather, and for printing woollens and carpets.

The fine rose color known as Magdala red, manufactured and exhibited at Vienna by MM. Duran and Huguenin, of Bâle, is the product of the reaction of azodinaphthylamine. It may be prepared as follows: heat on the sandbath, in a vessel of enamelled cast-iron, a mixture of

Azodinaphthylamine 6 parts,
Naphthylamine 9 parts,
Glacial acetic acid 5 parts,

raising the heat gradually to 402°, until the red mass takes a violet tint on its upper edges. Remove the fire, add three to four tenths of glacial acetic acid, stirring well, and pour the mixture into enamelled capsules. The crude matter thus obtained, containing acetate of naphthylamine, is transferred into a retort; caustic soda and water are added, and the mixture is boiled until all the naphthylamine has distilled over with the vapor of water. The residue is then slightly acidulated with hydrochloric acid, diluted with much water, filtered whilst hot, and the filtrate mixed with common salt. On cooling, Magdala red falls as a muriate in the form of a crystalline powder. By redissolving in boiling water containing a little muriatic acid filtering, neutralizing the filtrate with carbonate of soda, and treating with common salt, the coloring matter is obtained almost absolutely pure.

The alcoholic solution of this salt displays a splendid dichroism. When dilute it appears transparent and rose-colored by transmitted light, but by reflected light opaque and of a fiery red. This singular fluorescence is communicated to silk dyed with this color, which appears of a carthamine rose with orange reflections. Magdala rose is only used for light shades; in heavy shades it is deficient in brilliance. It has a tinctorial power equal to that of the aniline colors, and it resists air and light much better, for shades of the same intensity.

(c) *Phenol Colors.*—The Vienna Exhibition did not bring forward any new phenol colors; on the contrary, some formerly found in the market have been withdrawn, being superseded by aniline colors more beautiful or cheaper. Thus the picramate and isopurpurate of potash and azuline are no longer in use. Large quantities of picric acid are still made and consumed; also of aurine or rosolic acid, and of red, orange, and yellow coralline. As novelties we may mention the splendid coralline lakes exhibited by Guinon and Piccard, of Lyons. The magnesia-lake, the color of which resembles Turkey-red, is much used; but its permanence is not equal to its beauty. During the last year the "Baden Aniline Works," at Mannheim, have sent out a beautiful red color, eosine, which will probably have a great future in dyeing.

TABLE OF THE CHIEF ARTIFICIAL COLORING MATTERS NOW IN THE MARKET.

Reds.—Magentas, about twelve sorts; cerise, three sorts; coralline and aurine, three sorts; saffranine, scarlet, Magdala red, garnet, peonine, Coupier's red, eosine.

Violet.—Magenta violets (mono- or di-phenylated rosanilines), seven sorts; twelve to fourteen sorts of dimethylaniline violets, all soluble in water; mauveine.

Blue.—Nine or ten sorts of aniline blue (triphenylrosaniline); Nicholson blue, imperial blue, light blue, soluble in water or alcohol; induline, Coupier's blue, diphenylamine blue and methyldiphenylamine blue.

Green.—Six or seven sorts of iodine green; four or five sorts of methyl green; aldehyde green.

Yellow.—Aniline yellow, phosphine, palatine orange, picric acid, Martin's yellow, naphthaline yellow, coralline.

Brown.—Vesuvine, Bismarck, Havana, prunine, Manchester, naphthylamine brown, maroon phenicenne.

Grey and Black.—Silver grey and anil e black.—*Prof. Kopp, Moniteur Scientifique.*

MISCELLANEOUS CHEMICAL NOTES.

By S. DANA HAYES, STATE ASSAYER OF MASSACHUSETTS.

WITHIN little more than a year, there have been several cases of poisoning in the State of New-Hampshire, and three of them, which resulted fatally, were, after complete investigations, made the subject of well-contested trials, that have attracted general attention in New-England. There are features of interest to the toxicologist in each of these cases, and very brief records of them may prove valuable hereafter.

THE MAJOR STRYCHNIA CASE.

Edwin W. Major, of Wilton, twenty-eight years old, was tried twice, in September and December, 1875, for poisoning his wife, and was convicted of murder in the first degree. Mrs. Major died on the 20th of December, 1874, after about two hours' sickness. The characteristic ante-mortem symptoms of poisoning by strychnia were well observed—twitchings, convulsions, lucid intervals, rigidity, clenched hands, arched feet, etc., and the post-mortem examination, made one day after death, showed no disease of the vital organs; a full-grown healthy foetus, remarkable rigidity, arched feet, etc., and these appearances were observed again when the body was exhumed the second time, twenty days after death.

Dr. Edward S. Wood, Professor of Chemistry in the Harvard Medical College, made the analysis of the contents of the stomach and a portion of the liver, by Dragendorff's alkaloid method, and obtained excellent results and specimens for exhibition, which he proved by many chemical tests and by repeated physiological tests. I also tested the strychnia separated by Dr. Wood, and analyzed the stomach itself, after he had removed the contents. This is the first time that the Dragendorff method has been presented in evidence before a jury in this country, I believe, and as the accuracy of the process was questioned by the counsel for the prisoner during the first trial, a good opportunity for proving it was thus offered. After cutting it fine, I divided this stomach into two portions, as nearly equal as could be determined without weighing, and then separated the alkaloid from one portion by Dragendorff's process, and from the other by the modified Stas process, using only alcohol, acetic acid, chloroform, and potash, and proved it to be strychnia by the usual chemical and physiological tests. These portions of the stomach alone yielded 0.24 and 0.27 grain of strychnia respectively. The semi-fluid contents were estimated, from the part analyzed by Dr. Wood, to contain 1.72 grains, the stomach itself yielded 0.51 grain, and the liver, estimated from the portion analyzed, contained 0.23 grain of absorbed strychnia, the total weight being 2.46 grains in these organs.

Dr. Theodore G. Wormley, the eminent toxicologist, of Columbus, Ohio, testified to the accuracy of the modes of analysis and tests employed, and also as to the properties and characters of strychnia.

The counsel for the prisoner held that Mrs. Major died in puerperal convulsions, and from eating camphor, and they contested every point stoutly and in a most intelligent manner.

This case of circumstantial evidence is remarkable for the accuracy of the observations of the symptoms and post-mortem appearances, for the large quantity of strychnia recovered, for the completeness of the analyses and chemical evidence, and for the singular theory of the defence (puerperal convulsions), which was credited by part of the jury at the first trial.

THE MAGOON STRYCHNIA CASE.

David L. Magoon, of Raymond, sixty-one years old, was tried, in November, for poisoning his wife with strychnia, administered in a dose of essence of peppermint. Mrs. Magoon died on the thirty-first of August, 1874, about an hour after receiving something "bitter" to drink from her husband. There was no evidence given of ante-mortem symptoms, and there was no inspection by a medical man, but the rigidity of the body and clenched hands were observed by persons in attendance. The muscles of the arms were relaxed in fourteen hours.

One year after death, the body was exhumed, and the stomach, about one third of the liver, and one quarter of the intestines, were then removed and brought to me for analysis. These organs were in a remarkably good state of preservation, being entire and quite strong, and the stomach still held nearly one fluidounce of brown-colored, semi-fluid contents.

This unusual state of preservation was attributed to the position of the grave, in a dry gravel soil. The analyses were made by Dragendorff's method, and the alkaloid obtained was identified by the usual eighteen or twenty tests, including the administration to frogs. Part of the strychnia separated, with the portion of the intestines as received, was handed to Dr. Edward S. Wood, and he corroborated my work by determining the presence of traces of strychnia in the intestines, and by proving the alkaloid that I had separated from the other organs.

The stomach and contents afforded 0.15 grain, and the liver, estimated from the one third part analyzed, contained 0.684 grain of absorbed strychnia, the total weight being 0.834 grain in these organs, with traces in the intestines.

The prisoner was very well defended, and, after the usual legal doubts about chemical analysis had been presented, the theory of suicide was advanced, and so well supported, that, although the jury agreed that death resulted from poisoning by strychnia, four of them doubted the prisoner's guilt. Magoon is now in jail, and will be tried again in April probably.

This case is remarkable, inasmuch as strychnia in considerable quantity was found in the body a year and six days after death, and for the large proportion of the alkaloid recovered from the liver.

THE WILSON ARSENIC CASE.

Mrs. Sarah M. Wilson, a domestic, over fifty years of age, was tried for poisoning three members of a highly respected family in Lebanon, last April, by putting arsenious acid into the teapot. Two of the persons who drank the tea, a lady and a gentleman, recovered after excessive vomiting and purging; but the third, an elderly lady, died about forty hours afterward, with characteristic symptoms. The medical part of the investigation of this case, including the observation of the symptoms and the post-mortem examination made soon after death, was uncommonly complete, and there was an abundance of carefully preserved material for analysis.

One fluidounce of the tea, mixed with milk and sugar, as left in one of the cups, contained 2½ grains of arsenious acid, and the cups held nearly eight ounces. The moist leaves in the pot from which the tea was taken had more than 2 grains adhering to them. The stomach of the deceased lady contained 1.38 grains, the liver 3.86 grains, and the intestines 1.77 grains, making the total weight 6.91 grains of arsenious acid recovered from these organs.

The evidence in this case was carefully prepared, and it

was presented at the preliminary trial, and to the grand jury who found Mrs. Wilson to be insane.

Both of the persons who recovered must have taken ten or fifteen grains of arsenious acid in the tea that they drank; and their recovery, together with the full evidence of poisoning, make this an instructive case.

MANUFACTURE OF CREAM OF TARTAR.

By J. W. HAAS, Dubuque, Iowa.

THE argols, after being ground, are placed in a steam-cylinder, the quantity depending on the size of the cylinder—about eleven hundred pounds (1100)—to which are added the requisite equivalents of hydrochloric acid (H Cl) chemically pure, of thirty per cent gravity, and chloride of potassa (K Cl.) The cylinder is filled with water, and closed so as to be steam-tight. Steam is then admitted through a pipe, and permeates the mass.

The following formula expresses the chemical changes and reactions produced, and taking place under a pressure of steam of the requisite degree continued for three (3) hours:

The steam is then turned off, and the cylinder and contents allowed to remain till the crystallization of the bitartrate of potassa is complete, which usually takes about three (3) days. The mother-water is then drained off through the pipe C into another cylinder, charged as the above, with the addition of water sufficient to fill the same. By this means all undissolved tartrate of lime and uncrystallized bitartrate of potassa are saved and utilized. The crystals of bitartrate of potassa deposited in the cylinder and the insoluble and foreign matter at the bottom can then be removed. This product of bitartrate of potassa is chemically pure. By adding the necessary amount of animal charcoal when the argols are placed in the cylinder, all coloring matter will be removed.

It will be observed that this process differs essentially from those hitherto employed, in that I do not effect the solution of the argols by ordinary boiling, nor by heating by means of a steam-jacket. By either of these methods, which are the only ones now in use, a much longer time is required to effect the solution of the argols, and the requisite chemical changes.

DYEING RECIPES.

From Reimann.

EXTRACT BLUE FOR WOOL AND WOOLLEN PIECE-GOODS. (55 lbs.)

Make up the beck with 17½ ozs. sulphate of soda, the same weight of sulphuric acid, and from 7 to 17½ ozs. indigo, cal-mine according to shade. Boil up, cool and enter, boiling with continual turning till the shade is obtained.

SLATE-GREY, FOR THE SAME MATERIALS. (55 lbs.)

Boil for 45 minutes, with 11 lbs. logwood, 17½ ozs. of sulphate of soda, and 8½ ozs. sulphuric acid. Take out, and dissolve in the beck 8½ ozs. copperas; re-enter and boil for another half hour. If a very blue tone is wished, top with ammonia.

CINNAMON BROWN ON THE SAME MATERIALS. (55 lbs.)

Boil for 45 minutes with 4 lbs. 6 ozs. fustic, 26 ozs. logwood, 11 lbs. red sanders, 2 lbs. 3 ozs. to 3 lbs. 4½ ozs. myrabolans. Take out, and add to the beck 8 lbs. 12 ozs. to 11 lbs. copperas (?) Re-enter, and dye for half an hour at a boil.

DYEING AND FINISHING BLACK LINEN SEWING-THREAD. (11 lbs.)

Wet out in boiling water, and enter in a beck at 212° Fahr., made up of 17½ ozs. solid extract of logwood, and 3½ ozs. solid extract of bark. Work for an hour, lift, and hang out in the air for 12 hours. Return now to the extract beck, which should be at about 88° Fahr., give 8 turns and take out. Work for a quarter of an hour in a fresh cold beck of 6½ ozs. blue vitriol; take out, and dissolve in the old logwood beck 17½ ozs. of soda-ash. Enter, and give 10 turns. Take out, return to the blue vitriol beck, give seven turns. Take out, return to the extract beck, and give seven more turns.

Next, dissolve in the blue vitriol beck 7 ozs. copperas, enter the yarn, give 10 turns, and return to the logwood beck for seven turns. Finally, make up a fresh boiling beck of 8½ ozs. curd soap, and give seven turns. Oil or glycerine may be added to the soap beck to insure softness.

After drying, the thread is run over cold rollers, being twisted slowly all the time, that it may be flattened in different directions. It is essential that the thread should not be washed or undergo any other treatment after the soap beck.

GREEN ON MIXED GARMENTS. (11 lbs.)

The wool is dyed green by boiling for one hour with 2 lbs. 3 ozs. alum, 8½ ozs. argol, 4½ ozs. sulphuric acid, 2 lbs. 3 ozs. fustic, and 6½ ozs. extract of indigo. It is then entered in a beck at 190° Fahr., with 17½ ozs. alum and the same weight of fustic. Here the goods are worked for an hour, lifted, wrung out and entered in a fresh beck of 2 lbs. 3 ozs. sumach. Here they are soaked for two hours, turning frequently, lifted, wrung well out, and dyed in a fresh cold beck with methyl green. If the shade has to be darkened, decoction of logwood is added as required.

PONCEAU AND SCARLET WITH SAFFRANINE ON COTTON. (11 lbs.)

Prepare a boiling beck with ¼ kilo, turmeric, and work the goods in it for an hour. Take through a beck of 17½ ozs. sulphuric acid, lift and prepare for three hours at a boil with 2½ lbs. sumach. Take out and dye in a fresh beck at a hand heat with a clear solution of saffranine.

IRON GREY ON SILK YARN. (11 lbs.)

After ungumming, the silk is well washed twice and mordanted cold, with 2 lbs. 3 ozs. nitrate of iron and 17½ ozs. sulphuric acid, for light shades. For mediums, 4 lbs. 6 ozs. nitrate of iron may be taken, and for darker shades 8½ lbs. Give the silk seven to nine turns in the iron, and wash twice. Then dye with a mixture of logwood, peachwood, and fustic, according to pattern, at 110° Fahr. Wash once.

METHYL GREEN ON WOOL.

Boil the wool for fifteen minutes in a solution of the hyposulphite of soda, containing nearly ½ oz. of the dry salt to 20½ ozs. of water. When the wool is perfectly saturated, add to the liquid 81 grains of sulphuric acid. The liquid should look perfectly clear after the wool is removed. The beck employed must not be made of copper, lead, or iron. If the hyposulphite beck is made too concentrated, the wool will be