c.c. each—from the first, middle, and last portions of the distillate, gave respectively 61.1°, 61.2°, 61.5°, as the boiling points.

Alcohol (absolute) gave boiling point 78.05°; after purification from traces of water by sodium, boiling point 78°; again, a portion—about 130 c.c.—purified by quicklime gave as the boiling points of portions from the beginning, middle, and end of the distillate, 78.1° in each case.

Tetrachloride of Carbon, unpurified and undistilled, gave boiling point 76.3°; a first portion—about 3 c.c.—distilled from about 110 c.c. gave boiling point 76.25°; a last portion from the same gave boiling point 76.5°; again, about 15 c.c. were purified from traces of water and alcohol by boiling with sodium, and distilled; about 4 c.c. were taken of the first distillate, and gave boiling point 76.5°; about the same quantity at the very end of the distillation gave boiling point 76.6°.

While I was uncertain about the reading of the thermometer—as, *e. g.*, whether it was 76.2 or 76.3—I put it down as 76.25; but my thermometer was not divided so widely as to give exact readings to within less than 0.1° C.

The above determinations are, I believe, nearly exact, but my object in giving them is not to put them forward as accurate results, but as indicating, by the closeness with which they agree with each other for the same nearly pure liquid, the degree of accuracy which may be expected from the method when it is more matured.

At the present I have sufficient confidence in my results to say that the boiling points are not in error by so much as three tenths of a degree centigrade; and that, if there is an error of more than one tenth of a degree, it is due, not to any imperfection of the method, but to inaccuracy in the reading of the thermometer or of the barometer.

I hope before long to make some fresh determinations with more delicate thermometers.

The usual method for determining boiling points is incapable of giving accurate results, for this reason—that it is impossible to secure that the vapor tension of the liquid at the temperature observed differs from the atmospheric pressure at the level of the liquid by an inappreciable amount only. By my method it is quite possible, and not very difficult, to secure the fulfilment of this all-important condition.

St. John's College, Cambridge, January, 1877.

—*Chemical News.*

ON INDIGO STEAM BLUES.

By M. CH. ZURCHER.

A COLOR fulfilling all the necessary conditions of such a blue should contain, along with the thickening of the indigo, a reducing agent, and a substance neutral in the cold, but capable of becoming alkaline at the temperature of steaming. M. E. Schlumberger has proposed for this purpose the use of the cyanide of potassium; but this substance, besides its high price, is a powerful poison. The author finds that the bicarbonate of soda, whose alkalinity becomes strongly marked at a temperature of 158° F. to 176° F., furnishes, then, a neutral carbonate capable of dissolving white indigo.

A color formed of 35 fluid oz. of neutral gum water, 8½ oz. tin pulp, 3½ oz. bicarbonate of soda, and 10½ oz. of ground indigo pulp at 20 per cent., is not reduced in the cold, but, if heated, reduction sets in, and the white indigo is dissolved. If printed on to the cloth, the reduction of the color only sets in if the steam is very moist; therefore, it does not succeed in the ordinary steam-chests, but in steam-chlorine chests. The printed swatches come out from these chests with the greenish-yellow color of the solution of white indigo.

The problem of indigo steam blues will not be completely solved till a perfect arrangement for moist steaming has been discovered.—*Bulletin de la Soc. Indust. de Mulhouse.*

WOOLLEN PRINTING.

GREEN, FOR WOOLLEN CLOTH OR YARN.

Berry extract..... 17½ ozs.
Extract of indigo..... 17½ "
Oxalic acid..... 14½ "
Alum..... 17½ "
Calcined starch..... 17½ "
Print, steam for an hour, and wash.

STEAM GREEN FOR DELAINES.

Aldehyde green prepared for printing... 35 fluid ozs.
Gum water..... 350 to 700 "
Add 2½ ozs. of tannin, per 35 ozs. of mixed color. Steam for three-quarters of an hour, and wash.

BLACK FOR WOOL.

Extract of dry logwood..... 5½ lbs.
Dissolve and let settle, and add to the clear liquor the decoction of 16½ ozs. of galls, thickened with the same weight of gum tragacanth; let cool, strain, and add 3 lbs. 4½ ozs. pyrolignite of iron, at 15° B.; 2 lbs. 3 ozs. nitrate of iron, at 5° B. Print and steam for an hour.

GREEN FOR WOOL.

Dissolve 1½ ozs. oxalic acid in 17½ fluid ozs. of water, and add to this solution, whilst hot, 6½ ozs. of fustic lake, precipitated from a decoction of fustic with bichloride of tin. On the other hand, dissolve ½ oz. of extract of indigo, and 3½ ozs. of alum, in 17½ ozs. of water.

Mix the two solutions, and thicken with dextrine or gum Senegal.
Print, dry, and steam.

SCARLET FOR WOOLLEN PIECES OR YARNS.

Cochineal liquor at 70° B..... 5½ pints.
White starch..... 21½ ozs.
Boil well, and add—
Oxalic acid..... 1½ oz.
Stir till cold, and add, stirring continually—
Tin crystals..... 1½ oz.
Berry liquor at 7° B..... 3½ "
Mix well, print, steam for an hour, and rinse.

AMARANTH FOR WOOLLEN PIECES OR YARNS.

Dissolve 12 ozs. orchil, and make up the solution to 1½ pint. Extract 4½ ozs. cochineal, and make up the decoction to 26 fluid ounces. Mix and thicken with 8½ ozs. white starch.

Stir till cold, and add 3½ ozs. of alum in powder, and 1½ oz. bichloride of tin, stirring all the time.

Mix well, print, steam, and wash. The following colors may be employed either for machine or block work, and are distinguished for simplicity:

BLACK.

Dissolve 6½ lbs. dry extract of logwood in 10½ pints of boiling water; let cool and settle. Add to the clear liquid

17½ ozs. of black liquor at 5° B., and 4½ ozs. nitrate of iron at 50° B. Thicken with 8½ ozs. gum tragacanth. This latter weight must be varied according to the quality of the gum and the nature of the design. Print, air for 6 hours, steam for ½ hour at 212° F. Steam immediately.

BROWN.

Dissolve 2 lbs. 3 ozs. extract of redwood and 17½ extract of quercitron in 10½ pints of boiling water. Cool and settle, thicken the clear liquid with 4½ ozs. of gum tragacanth, and add 8½ ozs. red liquor at 5° B. The color may be used directly. For a deeper brown, add black liquor as may be needed. Print, air, steam, and wash.

BISMARCK BROWN.

In 10½ pints of boiling water dissolve 1 oz. of Bismarck brown, more or less, according to shade. Let settle and cool; thicken with 2½ ozs. gum tragacanth, the same weight of white starch, and ½ oz. of good glue. Print, air for 6 hours, steam at 194° F., and rinse.—*Le Teinturier Pratique.*

POISONOUS POTTERY.

THE study of *faïence* has its sanitary as well as its artistic side. An interesting report on the former branch has lately been made by the Parisian authorities.

It was necessary to ascertain, firstly, whether lead or copper entered into the composition of the glazing; and, secondly, whether the oxide of lead was vitrified on the surface, as a silicate, or whether it was simply melted. After visiting a great number of factories, M. Drouard was able to ascertain that the brown color in hardware was obtained by a mixture of peroxide of manganese, and the green by the introduction of a slight quantity of oxide of copper, improperly termed "calamine," while minium and sulphide of lead produce the yellow glazing. There are, therefore, two deadly substances in use—the minium and the oxide of copper. If the temperature of the oven were sufficiently elevated, the oxide of lead would be converted into silicate of lead, and be able to resist the action of at least weak acids. But to insure the success of this combination, it is necessary to consume a large quantity of fuel, and in Paris this operation is particularly expensive. The manufacturers consequently seek to reduce their outlay, either by augmenting the quantity of oxide of lead, or by burning less fuel. In this case the minium spread over vessels placed in the upper part of the oven is simply fused with the clay, and is easily dissolved by the most feeble acid. Various experiments were made in all the arrondissements of Paris, which conclusively proved that acid liquids, such as sour milk and also grease, often dissolved the oxide of lead contained in the hardware used for domestic purposes. The reporters consequently resolved that the strictest supervision should be kept over the manufacture of hardware for domestic purposes; that the manufacturer should be compelled to affix his mark to each article, so that it might be traced back to him whenever the glazing was found to have been improperly effected.

CHRY SOPHANIC ACID.

THE celebrated "Goa powder," used for ringworm, etc., has been found by Mr. Squire to consist largely of chrysophanic acid, a substance also obtained from rhubarb, dock-root, etc.

Mr. Squire finds that the properties of chrysophanic acid are by no means confined to its being a remedy for ringworm, but that it is likely to prove a valuable addition to the list of drugs as a remedy in many other diseases of the skin. He has, for example, obtained some unquestionably good results with it in the treatment of psoriasis, and it is a serviceable application in cases of lupus also.

THE NEW STAR IN CYGNUS.

On November 24 Dr. Schmidt remarked a new star of the third magnitude in the constellation Cygnus, which must have blazed out very suddenly, for it was not noticed when he last had an opportunity of observing on November 20 nor on any previous night, and could, therefore, hardly have been as bright as the fifth magnitude. The star very rapidly waned, falling to the fourth magnitude on November 28, to the fifth on November 30, to the sixth on December 6, and to the seventh on December 15, after which date it has but very slowly diminished. The position of the star is R.A. 21h. 36m. 50s., N.P.D. 47° 43'; and no record of any star in this place can be found in the Bonn Durchmusterung, which gives all stars down to the ninth magnitude inclusive, or in any other catalogue. Thus, till its sudden blazing forth last November, it has presumably been of extreme faintness, like the new star of 1866, *T Coronae*, and others before. Immediately after the discovery, Dr. Schmidt at once telegraphed to Prof. Littrow at Vienna, and also wrote to M. Le Verrier at Paris, where a spectroscopic examination of the star was made by M. Cornu on December 2 and 5, though the star had then fallen to the fifth magnitude and the weather was very unfavorable. M. Cornu found the spectrum to consist of bright lines on a faint continuous spectrum almost completely interrupted between the green and blue. The bright lines appear to correspond to hydrogen, sodium or helium, magnesium, and the coronal substance, which gives the line 1474K in the green. These are in fact the principal elements in the sun's chromosphere, so that the new star has presumably an atmosphere similar in its constitution to that of the sun, and it is this atmosphere which has suddenly blazed forth, the underlying photosphere giving comparatively little light, and thus presenting the exact converse of what occurs in the case of the sun, where the photosphere is so bright as completely to extinguish the light of the chromosphere. It is much to be regretted that no news of the discovery of this new star was sent to this country till December 9, when the published account of the Paris observations arrived. Unfortunately, cloudy weather on the Continent prevented observation at the critical period immediately after the discovery, while, if Prof. Littrow had telegraphed to England, observations might have been made on no less than eight nights preceding December 9. The omission is the more strange since the telegraph companies concerned have with great liberality made a convention, by virtue of which telegrams announcing astronomical discoveries are transmitted free of charge; and this concession is regularly taken advantage of to announce the uninteresting additions which are continually being made to the already too numerous swarm of minor planets. In the case of this star an opportunity, which can hardly be expected to recur soon, has been lost of determining the changes of the relative brightness of the various lines and in their breadths; from which most interesting results as to the temperature and pressure of the vapors in the star's atmosphere might perhaps have followed. The changes in the spectrum of hydrogen, as depending on

temperature and pressure, are in particular very remarkable, and a comparison of the three lines of this gas in the new star at different dates might have given most valuable information on this point. Even as it is, M. Cornu has, under very unfavorable circumstances, obtained most important results.

THE POSITION OF THE EQUINOX.

THERE has always been a difficulty in fixing the exact position of the point from which right ascensions are reckoned, as it can only be done by observations of the sun, from which the place of passage through the equinox is deduced. Such observations are liable to be affected by all sorts of errors, some of them depending on temperature, which may alter the state of the instrument and the rate of the clock in the interval from day to night and from summer to winter; while others arise from peculiarities in the observer, especially in the habit of observing the first and second limbs of the sun; and others, again, depend on the instrument, whether arising from errors of graduation of the circle or deviation from circularity in the pivots. These latter errors will affect the times of transit of stars and thus make it difficult to obtain a standard catalogue of the right ascensions of fundamental stars. It has naturally been the aim of astronomers to eliminate these various sources of error, and they have so far succeeded as to reduce the outstanding discordances between different sets of observations to a few hundredths of a second; but even these quantities are larger than would be expected if the thousands of observations employed were only free from systematic error. M. Nyren has lately discussed the observations of the sun made at Pulkowa from 1861 to 1870 and has been met with the same difficulties which have puzzled former astronomers, there being a considerable discordance between the declinations obtained by the two observers concerned. M. Nyren's result differs considerably from the mean of those found at other observatories, and in particular by 0".064 from the place of the equinox determined by Greenwich observations from 1836 to 1870, and by 0".055 from that given by former observations at Pulkowa. Though the places of the fundamental stars may require some slight corrections, they can hardly affect the result by more than a few thousandths of a second, and will therefore not account for the above discordances, which M. Nyren considers must arise from some unknown systematic errors. It is to be remarked that all the determinations of right ascension at Pulkowa have been made by one observer; while another, using a different instrument, has been charged with the observations of declination, and any personality in the habit of observing would affect the two co-ordinates differently. Such personality is commonly different for the two limbs, and consequently affects the place of the sun's center, so that, as M. Le Verrier has pointed out, it is in the present state of astronomy far more important to multiply observers than observations.—*Academy.*

FRENCH ACADEMY OF SCIENCES.

JANUARY—FEBRUARY.

On the Flow of Mercury in Capillary Tubes, by M. Villari. Conclusions: The quantity of mercury which flows in one second is 1°, proportional to the pressure under which the flow occurs; 2°, proportional to the fourth power of the radius of the tubes; 3°, inversely proportional to the length of the tubes, provided a certain minimum length, which is smaller as the tubes are less in diameter and the pressure lower, is not exceeded. For tubes of elliptical section, the minimum length, below which the preceding laws are not verified, is smaller than for circular tubes, the radius of which is equal to the average radius of the tubes of elliptical section. The above laws do not hold true when the flow occurs drop by drop. Finally, the quantity of mercury that escapes depends upon a certain constant, which must be determined for each kind of tube employed. This constant depends on the form of the opening of the tube and on the nature of its sides.

On an Experiment Analogous to that of the Singing Flames, by M. Montecat. A piece of burning charcoal, held in a little cup of wire gauze, is lowered in a long metallic tube placed vertically when the charcoal reaches the lower part of the tube, the current of air produced by the elevation of temperature causes a sound which increases in loudness as the combustion becomes more active. If the coal be gradually raised, the sound at first becomes more intense, then diminishes, and ceases on the middle of the tube being reached. If the upward movement be continued, the sound again is heard, but the note sounded is the double octave of the first. When the orifice of the tube is reached, the sound stops. By altering the length of the tube, the author obtains analogous results.

On a Graphic Study of Brain Motion, by M. Giacomini and Morso. A woman who had lost a large portion of the frontal bone and the two parietal bones was the subject of investigation. Over the portions of the skull thus deprived of bone, a Marey exploring drum was adjusted, which by a rubber tube was brought into communication with a drum governing a lever and pencil which left a trace. The traces obtained, even when the respiration was normal and not very deep, presented evident oscillations, and formed a zigzag ribbon with unequal sides, as the height of each pulsation diminished during inspiration and augmented during expiration. The more energetic pulsations of the heart produced almost always an augmentation of the pulsations of the brain. It was only after compression of the carotids or of the jugular veins that a diminution of volume of the brain, agreeing with a considerable augmentation of the height of each pulsation, was noticeable. During deep sleep, with snoring, there was a marked increase to the height of each pulsation. By compressing the jugular veins, an augmentation of the volume of the brain was produced. After twenty or thirty seconds of venous congestion of the brain, the volume of the organ began to diminish. During venous congestion, the pulsations increased considerably in height, and this increase continued for quite a long time, even after the re-establishment of normal venous circulation. After venous congestion there was always observed a diminution in the volume of the brain, produced probably by a contraction of the blood vessels. Very extended inspiratory movements exercised a profound influence on the form of the cerebral pulsations, and it was noted that the phenomena produced were the same as those shown on compressing the carotids. Every movement of the body and all intellectual work reflected themselves on the brain, which underwent a visible modification in volume and in the form of its pulsations.

On the Coagulation of Fibrine, by M. Schmidt. The coagulation of fibrine essentially consists in a process of fermentation. Albumenoid substances, formerly soluble, are converted under the action of a specific ferment and in pres-