dried litharge, in such proportions as to form—according to the purposes for which it is required—either a stiff paste or a thickish liquid, which quickly hardens into a homogeneous mass.

CAUSTIC ALCOHOL.

(SODIUM ALCOHOL AND POTASSIUM ALCOHOL.)

By ALBERT B. PRESCOTT, M.D., Professor of Organic and Applied Chemistry and Pharmacy, University of Michigan.

THE attention of the medical profession is just now asked to the claims of a new caustic, another one of that category of organic chemicals which have been from time to time brought forth from the musty records of pure science into the well-ventilated world of every-day use. As soon as the idea is mentioned it is very easy to see that sodium alcohol, or sodium ethylate, possesses certain striking physiological relations to the tissues, giving it novel claims to consideration as a caustic. Whether a more extended trial shall show that the peculiar action of this substance on the tissues gives it a decided value for some given use of a caustic, or even for any use of a caustic, it would, of course, be premature to assert. Though practically new, it does not really bring upon the tissue a new caustic; it merely offers a new means of applying an old and well-known caustic; doing this so that the application controls and regulates itself.

Dr. B. W. Richardson, of London, who introduced nitrite of amyl, amyl hydride, and other anæsthetics, and is known for more important work, first published the use of "caustic alcohol" in 1870, and has lately explained his use of the article more at length, owing to reports of decided success in its use by Dr. Brunton, and to some discussion of the matter in pharmaceutical circles, in the present first public attention to the subject.

The formation, chemical structure, and the theory of the action of caustic alcohol may be explained as follows: It is well enough known that when sodium (or potassium) is dropped into water that the metal displaces half the hydrogen of the water, which displaced hydrogen escapes as a gas, with effervescence, while sodium (or potassium) hydrate remains. This hydrate is, of course, an oxide of sodium and hydrogen, and is ordinary caustic soda. Now, when sodium (or potassium) is dropped into absolute alcohol, hydrogen effervesces away, and an oxide of ethyl and hydrogen remains, this being sodium alcohol (sodium ethylate), "caustic alcohol." Avoiding symbols, as but little more compact than words, the chemical structure of the compounds in question may be presented as follows:

Water.	Caustic Soda.	Caustic Potassa.
Hydrogen, { Oxide.	Sodium, { Oxide.	Potassium, { Oxide.
Hydrogen, {	Hydrogen, {	Hydrogen, {
Alcohol.	Sodium Alcohol.	Potassium Alcohol.
Ethyl, { Oxide.	Ethyl, { Oxide.	Ethyl, { Oxide.
Hydrogen, {	Sodium, {	Potassium, {

Sodium and potassium alcohols are very deliquescent solids, crystallizable, but melting at slight elevations of temperature. They are very different substances from mere alcohol solutions of caustic soda and potassa.

As sodium alcohol is better for use and much cheaper than potassium alcohol, only the former of these two analogous compounds will be now mentioned.

On contact with water sodium alcohol is resolved into sodium hydrate (caustic soda) and ethyl hydrate (alcohol). And this occurs, Dr. Richardson says, when the sodium alcohol is brought in contact with the tissues, and it is the produced sodium hydrate, common caustic soda, that actually does the work as a caustic. This is an old-fashioned caustic, caustic potassa more often taken, and, when not held in check, little deserving favor. It is held in check, in the use of sodium alcohol (1) by its limited production, from the restricted quantity of water in the tissues; (2) by the extreme drying of the tissues as dehydrated by the water used up in making the dry caustic soda and the anhydrous alcohol. Also, Dr. Richardson states (3) the absolute alcohol coagulates the tissue decomposition products, barring the spread of the caustic; and (4) the dead organic substances are preserved from further decomposition by the alcohol.

To completely stop the action of the caustic in the tissues it is only necessary, after removing the applied sodium alcohol, to add chloroform to the part, when all remaining sodium alcohol, and to some extent, also, the sodium hydrate, are extinguished (so to speak), by formation of sodium chloride and certain ethers.

The sodium alcohol is diluted, according to the end to attain, with absolute alcohol, and "can be used so as to cut like a knife," or so as to serve as a mild caustic, little more than a very sharp stimulant. Dr. Richardson places one part of the sodium alcohol to one and a half parts of the absolute alcohol, as the strongest caustic safe against causing hemorrhage, for vascular parts.

The preparation will dissolve opium and nearly all substances soluble in alcohol.

Dr. Brunton applied the new caustic to nævi, with marked success. Dr. Richardson states that he has used it in cases of bites of dogs, would recommend it in bites of serpents, uses it in many instances needing a caustic, and awaits further experience as to its adaptations.

It may again be remarked that no positive opinion of its real value, compared with other coagulating caustics, is ventured upon, in this presentation of the unique claims which this agent makes for itself, by virtue of its chemistry. Indeed, how far ordinary deliquescent caustic alkali becomes a constringing and coagulating caustic in the form of our "caustic alcohol," remains to be proven.

It is applied best by means of a pointed glass rod, or pointed prolongation of the glass stopper of a bottle to keep it in; next best, by a quill pen, freshly cut each time used. Glass brushes are apt to break off.

It can readily be prepared, by any pharmacist, with due care, provided only that absolute alcohol and metallic sodium are at hand. The alcohol must be very nearly or quite absolute, specific gravity not over 0.795. If the alcohol contains water, this water will simply form sodium hydrate, which will dissolve in the alcohol. The mixture soon turns brown, and there is little or no check to its action on the tissues. If diluted with alcohol not absolute, the water therein will decompose the sodium alcohol. It is not very laborious to make absolute alcohol from the ordinary, by distillation from quicklime, but that is too long a story for this occasion. Sodium is comparatively cheap now, about one-sixth the cost of potassium. The following are Dr. Richardson's directions, in substance:

Take one-half fluid ounce of absolute alcohol in a two-ounce test-tube. Set in a water bath at 50° F. Add, gradually, small cuttings of clean metallic sodium until hydrogen gas ceases to escape. Then raise the temperature to 100° F.,

and a little more sodium, or until the gas again ceases to rise, stopping to add if crystallization occurs. Cool to 50° F. (The preparation thickens.) Add one half fluid ounce of absolute alcohol (for the strongest caustic to apply, or more, as needed for the use desired). Two parts of absolute alcohol will require one part of pure sodium to make the absolute sodium alcohol.—*New Preparations.*

ARTIFICIAL COLORING MATTERS.

THE firm of P. Monnet & Co., of La Plaine, Geneva, have issued a report descriptive of the colors which they manufacture. Their scarlet and hortensia are derivatives of fluoresceine, in which bromine and hyponitric acid are jointly substituted. The scarlet is chiefly used in wool dyeing, while hortensia is applicable not merely to wool and silk, but to cotton. These colors are evidently closely connected with the "saffrosin" of Bindschedler & Busch, described in our last. Pyrosine I is pure binodifluoresceine, and Pyrosine R is a mixture of bi and tetraiodfluoresceine. Both are described as dyeing a fine ponceau shade, though tetraiodfluoresceine alone gives a color tending more to the violet. Our readers will remember that the "blue eosine, soluble in water," of Bindschedler & Busch, is the soda salt of this same tetraiodfluoresceine.

The Rose Bengale, phloxine, and cyanosine of Monnet & Co. are rose colored dyes, brome and iod derivatives of fluoresceine. The first mentioned was discovered in 1876 by Nöbling. Since the beginning of 1877, Monnet & Co. sell the soda salt of benzylfluoresceine under the name of chrysolin. It is soluble in water, and gives a fine yellow color upon tissues. It was discovered by Reverdin, chemist to the above firm, and is produced by the action of phthalic and sulphuric acids upon a mixture of chlorbenzyl and resorcin. Cotton is prepared to receive the resorcin colors by being mordanted in an alum beek previously neutralized by the careful addition of soda, and then in emulsive oil, as used for Turkey reds. Acetate of alumina gives, however, the best results.—*Chemical Review.*

DYES FOR WOOL TO STAND MILLING.

Dark Gray.—Boil for 90 minutes in a water containing—
Extract of sumac 2 per cent.
" " logwood 1 " "
Copperas 2 " "
For lighter shades reduce ware in proportion.

Silver Gray.—Boil for an hour in a water with—
Extract of sumac 2 per cent.
Logwood 1 " "
Soluble iodine violet 1/2 " "
Copperas 1 " "

Olive.—Boil for an hour with—
Fustic 50 per cent.
Bluestone 5 " "
Argol 2 " "
Sanders 2 " "
Copperas 1 " "

Bright Olive.—Boil for an hour with—
Fustic 50 per cent.
Bluestone 5 " "
Argol 2 " "
Copperas 1 " "
Extract of indigo, acid, as may be required.

NEW BLUE ON FLANNEL.

Red prussiate 8 per cent.
Sulphuric acid 8 " "

Enter at a hand heat and raise gradually to a boil, which is kept up for half an hour, and cool. Take out and add to the beek a strained solution of about 1/4 per cent. of the new "acid magenta," and the same weight of salt of tin, and dye for another half hour.

It is well before adding the magenta to take out a part of the flot, and make up with cold water. If several successive lots are to be dyed in the same bath the proportion of sulphuric acid and of magenta may be lessened after the first lot.

SOLID SHADES FOR WOOL.

Ash Gray.—Boil for 90 minutes with 4 per cent. of gallnuts, 2 of sumac, 4 of logwood, 3 of copperas, diminishing the proportion of the ware for light shades.

Mud Gray.—Boil for the same length of time with 3 per cent. of gallnuts, 1 logwood, 4 orchil, 1/2 soluble iodine violet, and 1 copperas.

Olive.—Boil as above with 50 per cent. of fustic or 15 extract of fustic, 5 logwood, 4 bluestone, 4 argol, 3 orchil, and 1 copperas.

Jet Black.—Boil for 90 minutes with 2 1/2 per cent. of bichrome and 2 of sulphuric acid. Lift, spread out, and let lie till quite cold, and dye in a second water with 40 per cent. of logwood, 8 fustic, and 1 1/2 bluestone. After boiling for an hour, wash and dry.

Blue Black.—Prepare as above with 2 1/2 per cent. of bichrome and 2 per cent. sulphuric acid. Then boil for the same length of time in a second water with 40 per cent. of logwood and 1 1/2 per cent. bluestone. Wash and dry.

Bright Blue.—Prepare as above with 3 per cent. of bichrome, 2 per cent. sulphuric acid, and 2 per cent. alum. Dye in a second water with 25 per cent. logwood, and the solution of 1/4 soluble aniline violet. Wash and dry.

Reddish Brown.—Boil for 90 minutes with 3 per cent. of bichrome and 2 per cent. sulphuric acid. Let cool in the flot, and enter in a cold water made up of 30 per cent. of peachwood, 5 per cent. of fustic, and 1/4 of alizarine orchil. Raise to a boil, and keep it up for half an hour.—*Teinturier Pratique.*

BLASTING GELATINE.

A NEW and powerful explosive, discovered by Nobel, and pronounced by the Austrian military authorities to be highly suitable for military purposes, promises to be very useful in the arts of peace. This substance, called "Blasting Gelatine," is formed by dissolving collodion of cotton in nitro-glycerine in the proportion of 10 per cent. of the former to 90 per cent. of the latter. The result of the solution is a gelatinous, elastic, transparent, pale-yellow substance, having a density of 1.2, and a consistency of stiff jelly.

The new explosive is in itself much less easily affected by blows than ordinary dynamite, but it may be rendered far

more insensible to mechanical impulse by an admixture of a small proportion (from 4 to 10 per cent.) of camphor. Experiments have been carried out, the result of which is to prove that the new explosive possesses, weight for weight, 25 per cent., and bulk for bulk, 40 per cent. more explosive power than ordinary dynamite. With moist gun-cotton, gelatine compares nearly as favorably. The temperature at which it explodes is about 204° C., when heated gently, and 240° C. when heated suddenly. The addition of camphor, however, seems to raise this point to 300° to 330° C.

Water has little or no effect upon this substance; it may be burned in considerable quantities without any fear of explosion, and it is as stable and durable as either dynamite or gun-cotton. The cost of production of the new article is half as much again as dynamite, and about the same as that of compressed gun-cotton.

THE ORIGIN OF TEMPORARY AND VARIABLE STARS.

[From the Christ Church (New Zealand) Press.]

THE following paper was read by Professor Bickerton, at the meeting of the Canterbury Philosophical Institute, New Zealand, on Thursday, July 4th:

The sudden appearance of stars in various regions of the sky have been recorded from very early dates. Some of these stars have had an intensity of light greater than any of the fixed stars, and in some cases have remained visible for a year or more, the intensity of light all the while gradually diminishing.

Two considerable stars of this kind have appeared within the last twelve years, and in both cases they have been examined with the spectroscope. Unfortunately the results have not been so satisfactory as could be desired. The spectrum of the star of 1866 appears to have been continuous, with bright lines. The lines diminished in number and intensity until they finally disappeared, leaving only a feeble continuous spectrum. The light of the star of 1877 at first appeared yellowish, and when five or six days afterwards it was examined with the spectroscope, a line spectrum was seen. The number of lines gradually lessened until only one was left, and that the same line as seen in some nebulae.

A few considerations will show the stupendous nature of these phenomena. Temporary stars have all appeared to be fixed in the heavens, this fact showing them to be at true stellar distances, and consequently, like the fixed stars, their luminosity is comparable to our sun. The sun may be roughly classed as a star of the second magnitude; its intensity is approximately 1/400th that of Sirius, which is a very short distance from us relatively to the size of our universe, therefore it is not improbable that these temporary stars should be on an average at least as far away as he is.

We may therefore safely assume that most of the temporary stars whose appearance has been recorded, have had an intensity of light as great as the sun, and probably in some cases many times greater, and the amount of heat radiated from each square yard of our sun's surface is estimated to be equal to the combustion of ten cubic yards of coal in every hour, whilst the sun's disk has four times the area inclosed by the orbit of the moon. The star of 1866 when first seen was of the second magnitude, and its spectrum shows that it consisted of a nucleus of compressed gas, or of liquid or of solid matter. This was surrounded by an atmosphere of heated gas, having a greater monochromatic light than the nucleus, or it might have been simply a small permanent star in the same line of vision as the gaseous temporary star. I cannot say if this suggestion agrees with the present condition of the star. This star diminished from a star of the second magnitude to the tenth in about a fortnight. The spectroscope showed the star of 1877 to be ignited gas only, and from the number of the lines diminishing the temperature and pressure probably did so likewise. The intensity diminished in four months from the third magnitude to the ninth.

Many hypotheses have been formed to account for the nature of these stars, of which the following appears to be the most noteworthy:

1. Zöllner imagines a sun in which spots have covered the whole surface, the temporary stars being produced by the breaking up of such a surface.

2. Vogel assumes a volcanic bursting out on a dead sun.

In both of these hypotheses a decomposition and combustion of hydrogen and other elements is also assumed to account for the great intensity.

3. Meyer and Klein suppose that a similar dark body is suddenly raised to incandescence by the projection of a planet or other body upon its surface.

4. Proctor supposes that the atmosphere of a dead sun is suddenly brought to a high degree of luminosity by the passage of a meteoric train through it.

In examining these hypotheses, we find that there is one thing in common, namely, the assumption of the existence of large dark bodies in space. The first two of them also depend on the existence of internal commotion, attended with combustion. The last two depend upon the energy developed by gravitation.

A little consideration will be sufficient to show that on grounds of intensity alone, Zöllner's and Vogel's, in fact, any hypothesis not dependent upon gravitation, is improbable. Is it conceivable that a dark body should suddenly change its surface by volcanic or other internal action in such a manner as to heat gases to a pitch of luminosity as high as our sun's, especially when it is considered that if a gas and solid be at the same temperature, the solid is much the more luminous of the two; nor would combustion or decomposition help it; generally the latter would take place, but would tend to diminish rather than increase the intensity. How inadequate combustion would be is shown by the fact that a pound weight would develop about forty million units of heat in falling upon the sun, and the combustion of a pound of mixed oxygen and hydrogen would only develop about 4,000 units. And again, in either case the chief luminosity must be from the fused material; a continuous spectrum would then result, which in the last star at least is altogether contrary to observation. The precipitation of a body upon the surface of a dead sun is much more probable; so likewise is the meteoric theory; but in the former case if sufficient heat could be developed a fused mass would almost certainly result, and in the latter case nothing short of a marvelous combination would prevent its resulting. The latter hypothesis Proctor bases on the bright momentary light once observed on the face of the sun; he assumes that the gaseous photosphere was temporarily raised to a high luminosity by meteors. I think this of itself is very improbable. I cannot conceive how it is possible that if the atmosphere were raised to incandescence it could cool again in so short a time as two minutes. I think it far more probable that that most wonderful phenomenon (affecting as it did the entire earth)