added to the concentrated iodide solution after it has been allowed to cool to 90° C. If it is added to the iron iodide solution before concentration, the hypophosphorous acid is more or less decomposed. The Pharmacopoeia states that hypophosphorous acid begins to decompose between 130-140° C. The decomposition appears to commence below this temperature and in experiments where it was added to the solution before evaporation, the decomposition was quite marked. If the manipulation be changed and the hypophosphorous acid added before concentration, then the evaporation must be done on a water-bath.

A LABEL VARNISH SUBSTITUTE.

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The ordinary label varnish is quite unsatisfactory in appearance and application. Labels may be made water and acid proof by the application of a saturated solution of solid white paraffin in petroleum ether of boiling point from 40 to 50 degrees Centigrade. The process consists in simply touching the label with a small piece of cottain saturated with the solution. The petroleum ether evaporates almost instantly, leaving an invisible coating of paraffin which retains the new lustre of the label as well as making it water and acid proof.

INFLUENCE OF CLIMATE ON VARIOUS CHEMICALS.

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A knowledge of the chemical and physical properties of the various compounds of the materia medica constitutes a prerequisite of qualification of the professional pharmacist. To this must be supplemented an adequate knowledge of the best methods to be employed for their preservation, and as a rule, the educated pharmacist becomes very skillful as the years pass and his experience is extended.

The manufacturing chemist, however, occupies a somewhat different position in that, no matter with what scrupulous care his products are made, they are distributed over a wide domain, and are subjected to variations of climate which affect more or less their stability, and as frequently happens, in deference to his judgment, the container is apt to be accepted by the purchaser, as the one best adapted to the preservation of its contents.

The knowledge and technical skill of the chemist is profound. He must be a mathematician, a skillful physicist, and be possessed of an extensive knowledge of chemical compounds, and yet, in spite of this acknowledged ability, there sometimes appear seeming incongruities.

The chief of these is the character of the container which he employs for the transportation of his products. These are frequently of doubtful sufficiency, in view of the wide range of climate conditions which prevail within the borders of the United States alone, to say nothing of its territories and the foreign countries which may be their destination.

The writer recently expressed himself to this effect to a prominent manufacturing chemist, and was informed by him that the container was very often a matter of selection upon the part of the buyer, and supported his statement by exhibiting a list of chemicals, some of which were very expensive, and all of them susceptible of change upon exposure. These, he further stated, were ordered to be packed in paper cartons, and that he was compelled to comply with this commercial requirement, or lose the business.

Of course, there is involved in this both a moral responsibility to the public, and a professional pride, which we will not discuss.

That he had a knowledge of the possible influence of climate, goes without saying. That he had an adequate conception of the magnitude of those influences as manifested within the area of our own country alone, is doubtful.

The object of this paper, however, is not to discuss the container nor the responsibility of the manufacturer for his products after they are shipped, but rather to call attention to conditions which exist, and which are constantly affecting the stability of many substances destined for medicinal use, thereby causing them to *no longer respond to the requirements of the Purity Rubric of the United States Pharmacopoeia*—and further, to suggest the establishment of a systematic research, which shall have for its object the investigation of the prevailing climatic conditions in given areas, and their influence upon various chemical compounds.

Such a research could not be conducted properly by a single individual, but would require the cooperation of a number of men distributed over a wide territory, working simultaneously, with the same compounds, and using the same physical measurements.

It need not be expensive, nor take a great length of time. The data collected and finally tabulated, would be of interest and serve as a guide to the pharmacist, and be of economic value to the manufacturer and jobber.

Chemicals Affected. The limits of this paper will not permit of the enumeration of a great number of chemicals, and we shall therefore confine ourselves to the consideration of a few which may be regarded as typical—later on we shall specify the chief physical or rather meteorological influences which are constantly at work in effecting their undoing.

The chemist who has resided at sea level all his life, whose experiences have been exclusively along the coast states, and accustomed to making his observations in an atmosphere almost constantly at the point of saturation, with respect to atmospheric moisture, has but a vague idea of the conditions which his products are destined to encounter.

In the case of polyhydrated salts, or those which contain a large number of molecules of water of crystallization, he knows by theory, that they are susceptible of efflorescence, but as to the magnitude of the possible loss in weight of water, he has absolutely no definite knowledge.

Owing to the vast extent of the area of the United States, chemicals are variously affected in widely separated sections, and consequently the physical properties described by the manufacturer do not permanently or uniformly apply.

Strontium bromide is sometimes described by eastern chemists as a very deliquescent salt, while here in Denver, the Rocky Mountain region, and upon the arid plains as far east as the Missouri River, it is practically a permanent crystalline body.

Along the sea board, chloral hydrate is difficult to dispense, and moisture is so rapidly absorbed as to wet the paper while in the act of weighing. At Denver we have no such experience, and it may be of interest to the reader to know that the writer has dispensed this salt in powdered form enclosed in ordinary powder paper.

To open a bottle of zinc chloride along the coast and expose its contents but for a few minutes, is equivalent to reducing the salt to the liquid state. At Denver the bottle may be repeatedly opened and the contents will retain their granular structure for a long time.

The isometric salts, magnesium sulphate and zinc sulphate, both containing 7 molecules of water of crystallization, lose their beautiful prismatic structure, and ultimately fall to an amorphous powder, in this section of the country. Copper sulphate, sodium carbonate and sodium borate are all similarly affected here. My recollection of the far East is that, with the exception of soduim carbonate, these salts were never seen in any other condition than their normal geometric triclinic and monoclinic forms.

Among the volatile salts, ammonium carbonate requires special care in all parts of the country, in order to avoid the loss of its basic gaseous content, and the consequent change in its chemical nature.

At this point, Denver, sodium phosphate will lose 5 molecules of its water of crystallization or 25 percent; sodium carbonate, containing 10 molecules, will lose 5 molecules or 31 percent of their molecular weights.

It must be understood that we are speaking of chemicals destined for chemical and medicinal use, and not the heavy drugs intended for industrial purposes. A chemist would have no difficulty in taking any of the substances named, which had been subjected to the changes spoken of, and to make his solutions by the methods of standardization employed in such cases.

The pharmacist and druggist, on the other hand, is called upon to furnish substances conforming to the Purity Rubric of the United States Pharmacopœia, and must therefore depend implicitly upon his manufacturer.

A normal volumetric solution whose saline content includes a basic element which is the chemical equivalent of one, two or three replaceable hydrogen atoms of an acid, could not be prepared by taking the molecular, or the fractional molecular weight of a salt that had lost from 20 to 30 percent of its water of crystallization. It is for this reason that the Purity Rubric of the U. S. P. directs "carefully selected crystals showing no trace of efflorescence or adhering moisture."

We now come to the consideration of the influences which are at work; they are few but potent.

Temperature. Latitude plays an important part in governing the temperature of a restricted territory, but it will be noticed that the isothermal lines delineated upon the maps issued by the United States Weather Bureau vary greatly from day to day, owing to atmospheric disturbances which sometimes cover a wide area.

Atmospheric Pressure. Barometric depression varies but slightly and within narrow limits at any given point; it is nevertheless powerful in its effects.

At sea level the barometer stands at about 30 inches or 760 mm. When you reach the Missouri River traveling west and arrive at the great American plains, there is a gradual increment of altitude as you approach the Rocky Mountain region, which is accompanied by a decrease in pressure amounting approximately to one inch of barometric depression for every 900 feet of elevation.

For example, the difference between the altitudes of Kansas City and the city of Denver is about 5000 feet. The barometric depression would, therefore, be about 5.5 inches, making the barometric depression at Denver 24.5 inches.

The difference between Kansas City and Leadville, Colo., is 10,000 feet, or nearly two miles in elevation, making the barometric depression at the latter point about 18.7 inches.

The difference of elevation between Kansas City and the summit of Pike's Peak is about 14,000 feet or a barometric depression of about 14.5 inches.

The physical effect of this partial pressure is to decrease the boiling point of water, and consequently to *increase* the rapidity of evaporation, especially in the absence of atmospheric moisture, a condition which is almost constant at Denver and vicinity. This tendency to evaporation is the chief cause of the instability of efflorescent salts to which we have referred.

Atmospheric Moisture or Vapor Tension. This varies from 0 to 100 percent.

The atmosphere is said to be saturated when it contains 100 percent of aqueous vapor, and if there be a decrease in temperature, will be manifested by precipitation either in the form of dew, rain, hail or snow. An atmosphere laden with moisture is favorable to the stability of efflorescent salts, while the reverse is true with respect to deliquescent salts.

Temperature, pressure and atmospheric moisture are the chief influences; the remaining two, electrical potential of the air, and gaseous content, need not be further considered, except with respect to the numerical value which they take as factors in the possible combinations of meteorological conditions, which we will now endeavor to show.

Magnitude of Meteorological Influences. There are eight influences which constitute the fundamental data of meteorological science, five only of these are available in the matter under discussion as affecting chemical compounds; these we have already named.

Our problem is therefore resolved into the question: How many combinations of these influences are possible to exist at any moment of time within the area of the United States?

Here $n=8$; $r=3$; then, $n-r+1=4$.

Employing the general formula for combination,

$$\frac{n\ (n-1)\ (n-2)\ \ldots\ldots\ (n-r+1)}{\lfloor r};$$

$$\text{Or}\quad \frac{8\times7\times6\times5\times4}{1\times2\times3\times4\times5}=56 \text{ possible combinations.}$$

And if the variations of temperature from 10 degrees Fahr., and atmospheric moisture from 0 to 100 percent, were extended through the twenty-four hours of the day, and included in our calculation, the number of permutations and combinations would reach an inconceivable number.

While there may be no perceptible change effected by these minute variations, their influences are nevertheless constantly at work, seeking to break down the molecular structure of chemical compounds.

Heat, for example, is most effective in releasing the gaseous NH_3 and CO_2 from Ammonium Carbonate, causing that compound to lose its characteristic translucent appearance and take on that of an opaque body, changed in its chemical constitution from a carbonate to a bicarbonate.

What has been written in the preceding pages contains the elements of an important research—its magnitude precludes the possibility of individual achievement, and its successful accomplishment will depend upon the cooperation of a number of qualified men, willing to work.

ON CRYSTALLINE KOMBE'-STROPHANTHIN.

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Commercial Strophanthus Kombe seed has frequently been found to contain seeds of different Strophanthus species. Mr. E. M. Holmes, F. L. S., the curator of the museum of the Pharmaceutical Society of London observes,[1] "The Strophanthus leaves on the table were presented to the society's Herbarium some months ago by Mr. Lindsay, the curator of the Edinburgh Botanical Garden. They had been grown from some of the seed, used by Professor Fraser, apparently the greenish brown kind. These leaves differed considerably from those specimens of Strophantus Kombe in the Kew Herbarium, so that it appeared, they were derived from a hairy leaved species, resembling Strophanthus hispidus, but not identical with it."

Twenty-two Kg. Strophanthus Kombe fruit (seed in pods) in very good condition were identified by Mr. Holmes of London as true Strophanthus Kombe Oliv. seeds. This statement is of great value, as there are more than twenty-nine

[1]The Pharmaceutical Journal and Trans., 1887, 17, p. 754 and p. 755, also 1889, 20, p. 335.