and time to decompose and unite with the soil; also to work in sand or clay as wanted, and thus improve the texture. It also admits of underdraining if required and not yet done. The last work is a coat of manure in the fall, leaving the ground unsurpassed in the spring for early working with the harrow and the reception of the seed. Sow plenty of seed, sow evenly, and follow with roller or light harrow. A lawn is intended to be permanent, and therefore requires pains taken with it, not only in the start when established, but to keep it established. It then becomes the greatest attraction of the homestead.—F. G., in *Country Gentleman*.

THE VALUE OF HEN MANURE.

SHOULD all the droppings from the roosts by hens be carefully saved in barrels, and every spring and fall this manure be composted with any good soil or muck from swamps, and kept a few months, its value for any crop is equal to Peruvian guano, and may, I think, be estimated at fifty cents per fowl per annum. From fifty hens I save about ten barrels of the pure hen guano during the year. What I save from November to April I compost in the spring with soil. First, I spread soil in a circle to the depth of three or four inches, then I spread hen manure about an inch deep; then I spread another layer of soil, till the heap is completed, using about four times the bulk of soil that I do of manure, the last layer being soil. The top of this compost heap I make flat to catch the rains; then I cover with any refuse or straw, then place some sticks of wood or boards against the covering to keep it in its place, and in two or three months it is ready for use, having become thoroughly incorporated with the soil, but as the season for planting is then nearly past, I leave the heap until the next season, when I use it with what I compost in November. Perhaps it would be better to make a compost in March, where the climate will admit, and use the manure for crops planted the last of May or early June; but I can discover no loss by keeping it till the next season. A gill of this compost in a hill of corn will be equal in effect to half a shovelful of manure.—*Woodbury News*.

WHITE AND YELLOW CORN.

MR. J. AVERILL, of Paw Paw, Mich., asks an answer from your correspondent to the following question: "What is the relative value of white and yellow corn for feeding purposes, and especially for the fattening of pork?" I am sure I do not know, and I do not know any one who does know so fully that we can accept his knowledge with entire confidence that he is correct; and for the reason, in the first place, that we have no accurate analyses of Indian corn to the extent necessary to enable us to decide whether white or yellow corn contains the greatest amount of fattening or carbonaceous substances. In the second place, no doubt that soil, situation, climate, and latitude affect Indian corn, as they are known to do wheat; and Indian corn, like wheat, would be pretty sure to take up more mineral matters from the soil, and more nitrogenous ones from the soil and atmosphere together, on strong, rich land, and under a long, warm summer climate, than on a poor soil, in a short, cool summer. We know most Southern corn absorbs more water in cooking than Northern corn, makes better bread, and, if we accept the accounts of travelers as facts, we know the national tortillas of the Mexicans to be made of Indian corn solely, and, after being baked, to be tough and leathery, as buckwheat cakes are.

So far as Illinois is concerned, nine tenths of all the corn grown is of the yellow varieties, the preference for white corn being confined to the southern part of the State; but those eaters of corn bread having Southern antecedents are sure to choose white corn meal, as those of Eastern are quite as sure to select yellow meal for culinary purposes. If our information is correct, the larger share of the corn grown in the South is of the white varieties, the white ones only being used for bread, as the yellow ones are cultivated and preferred in the North. Generally speaking, then, on these grounds I think it may be safely assumed that Northern corn contains most oil and starch, and Southern corn most mineral and albuminous matter; that the former will produce the largest increase of adipose matter in the shortest time, and the latter will increase the size of the bones and muscles most in the same way.—*Country Gentleman*.

LAC AND THE LAC INSECT.

At the usual monthly meeting of the Metropolitan Scientific Association, London, Mr. W. K. Marriott gave interesting particulars of his recent researches into the natural history of the lac insect, concerning which so little has been hitherto known that specimens could not even be obtained from mounters of microscopic objects. The lac insect is a species of coccus, which secretes the gum known to commerce as gum lac, and upon opening any mass of this substance entombed insects are found as well as cavities formerly occupied by escaped members. He had dissolved stick lac in spirits of wine, and the released insects, mounted, were exhibited in detail at the meeting. The young insect is born alive about July, and at once finds its way to some part of the tree on which it fastens, and, absorbing the juices of the tree, begins to secrete lac. The young at this period are of elliptical outline, obtuse toward the anterior, and have two eyes and three pairs of legs, besides two other protuberances which, in the case of males, develop into wings. Up to the age of a month no difference in sex is observable, but afterward remarkable divergences take place. Supposing it to develop into a female, then in eight or nine weeks it loses its eyes, antennae, and legs, but its head and posterior organs become abnormally enlarged. The mouth shows several hollow tubes, and the protuberances on each side throw forth extensive tracheae. The female, it may be added, is permanently incarcerated in the gum. If a male is developed, the short antennae become long, the eyes protrude, and two other eyes appear on the ventral side of the head, while the legs become noble limbs. If born in July the male has no wings, but if born later he possesses them, this arrangement being necessary from the fact that he has to seek the female under different circumstances. His cell is, of course, provided with an aperture from which he can issue. The proportion of males to females has been estimated at 1 to 5,000, but this is open to question, as some masses examined by Mr. Marriott showed the males to actually preponderate. The young are born in July, and by August all are secreted, and in September the females are impregnated. About September 20 the females concealed under the lac throw out great quantities of a cottony-looking substance through the three apertures. The pouches now contain ova filled with globules containing oily matter, which is no doubt the food of the young, and globules containing coloring matter. The young issue from the rectum,

and, if crushed at this time, yield a scarlet dye. The insects do not appear to frequent any special variety of tree, but possess the power of changing any kind of juice into gum lac. It seems probable that the lac is secreted through the orifices in the skin, because the insect, when examined, has numerous perforations, giving him an appearance similar to the Foraminifera.

In the course of the discussion which ensued, the President pointed out the remarkable manner in which the original Sanskrit term for gum lac—namely, Laksha—had been followed by the allied languages—German: Lack, gummilack; French: Laque, gomme laque; Italian: Lacca, gomma-lacca; Spanish: Goma laca; Russian: Laka, gummilak; Arabian: Laak; Hindostanee: Lak'h. The various details of the lac insect exhibited had been mounted with remarkable success by the librarian, Mr. W. West.

NEW METHOD FOR THE ESTIMATION OF SULPHUR IN ORGANIC COMPOUNDS.

By M. W. ILES and C. FAHLBERG, Chemical Laboratory Johns Hopkins University.

CONSIDERING the number of methods which have been proposed, as for example that of Liebig, Kolbe, Debus, Russel, Carius, Warren, and Sauer, Mixer, Wiedel, and Schmidt, etc., one would naturally suppose that nothing was to be desired for the analysis of sulphur in organic substances.

We recently had occasion to make a number of determinations of sulphur in organic compounds, and were led to investigate the various methods proposed, and to carefully try a number of them—some of which were found not to be of general applicability, others gave results too high or too low, while others required complicated apparatus, thereby causing opportunity for unavoidable errors.

We will not at present discuss the relative merits of the various methods, but will proceed at once to a short statement of our own, which we hope, for its very simplicity and accuracy, will commend itself to the attention of chemists.

Fuse from 30 to 50 grms. of pure stick potassium hydroxide in a large crucible, preferably a silver one.

Introduce from 0.1 to 0.5 gm. of the substance upon the solid potassium hydroxide. If the substance can be conveniently transferred to the crucible without the use of water it has been found best, as the presence of water makes the operation unnecessarily long.

The mixture is then gently fused until the potassium hydroxide has lost all of its water, and the liquid has assumed a quiet state. This operation is not a violent one, but water and gases are gradually evolved.

Heat is applied gently at first, and increased as the operation proceeds.

It is immaterial in what form the sulphur exists in organic compounds, since the sulphur in all cases will be transformed into an oxygen compound, and will be found combined with the alkali, which is present in excess.

In this operation potassium sulphite will be formed. In no case was there a trace of the lower oxides of sulphur detected, although in some cases there may be produced a minute trace of potassium sulphate.

The fused mass is then treated with water, filtered if necessary, and to the clear solution is added a saturated solution of bromine water, until the liquid has assumed a slightly yellowish tint. Hydrochloric acid is then added to acid reaction, thereby producing oxygen and bromine *in statu nascenti*, both of which are powerful oxidizing agents.

The mixture is then heated, gently at first, until all the bromine has been expelled. To the clear solution barium chloride is added, and treated as usual for the determination of barium sulphate.

As will be seen from the above statement, we have a mixture, after the addition of bromine water, consisting of potassium bromide, potassium bromate, and potassium sulphite.

If now to this solution hydrochloric acid be added, there will be a liberation of hydrobromic acid, which will act upon the bromate, in a manner similar to the incomplete action of hydrochloric acid upon chlorates in solution.

Furthermore, we will have a complete decomposition of the bromate by hydrochloric acid, by which there will be formed also nascent oxygen and bromine.

To illustrate the correctness of this method, a number of analyses have been performed, which will be given in a later and more extended communication.

It is our intention to employ this mode of oxidation in a number of cases which do not bear upon the question under consideration.

We wish to direct the attention of chemists to the fact that the potassium hydroxide, as ordinarily found in this country, and sold as chemically pure, contains a very large amount of potassium chloride. In such cases it is not advisable to use a silver crucible, as the silver is thereby attacked, forming chloride of silver.

BALTIMORE, April 17th, 1878.

AMMONIA.

At the present day its main sources are the ammoniacal liquor produced in the manufacture of gas—a source which is so polluted that it is next to impossible to obtain pure products from it. Formerly the ammonia found in commerce could be obtained sufficiently pure, the manufacture for a long period having been conducted on the same principle and originally produced from the soot collected from the burning of one form of animal excreta—camels' dung—in Egypt near the temple of Jupiter Ammon (whence we get its name). It was afterward obtained from putrid urine, and also by the destructive distillation of animal substances. At the present time we may be said to depend entirely upon three sources for our supply—the gas liquor already pointed out, the boracic acid layers of Tuscany, and such animal matter as bones, hartshorn, etc.

The ammonia from gas liquor, which forms the largest portion of our supply, is, perhaps, the most impure, being contaminated with many of what are termed the compound ammonias, together with other matters of an empyreumatic nature.

The dry distillation of animal matter yields a product more easily purified, its main impurities being empyreumatic. The finest and purest kind of ammonia is, however, that obtained as a by-product in the manufacture of borax. When soda is added to the boracic acid, ammonia in a state of great purity is evolved, and is made use of for the production of ammonia solution and ammonia carbonate, which are met with in commerce under the name of "volcanic ammonia." This is the purest obtainable in the usual way, and is what we would always recommend our readers to employ for all delicate work.

Solution of ammonia is most commonly met with in an almost saturated form of specific gravity .88, a fluid drachm containing 15.83 grains of pure ammonia. It is liable to become contaminated with carbonate, lime, metals, sulphates, chlorides, and sulphides, its freedom from which would be shown by the absence of precipitate or turbidity upon the addition of solution of lime, oxalate or hydrosulphuret of ammonia, or ammonio-sulphate of copper, and, when treated by excess of nitric acid, by the absence of turbidity upon addition of nitrate of silver or chloride of barium. The solution should further be free from color, which, in conjunction with a peculiar smell, indicates the presence of empyreumatic oil.

A well-known quality of the solution is its power of dissolving many salts and oxides insoluble in water—notably silver oxide and bromide.

The carbonate of ammonia, so called, is, in its parent form, perhaps more correctly called the "sesquicarbonate," there being other carbonates containing less and more acid. It is obtained by sublimation in cakes about two inches or more thick, which, when quite fresh, have a clear, translucent appearance, rather fibrous than crystalline in texture. Exposed to the air the pieces decompose rapidly, ammonia being evolved and the acid carbonate left behind. This decomposition is shown by the change in appearance of the carbonate; it becomes quite opaque, a few minutes' exposure to air being sufficient to produce a visible alteration. Even when kept in well-stoppered bottles it will gradually alter, and, in consequence, it is always necessary when making a solution to remove all the opaque crust, and use only the clear, transparent inner portions of the lumps.

The composition of the sesquicarbonate is open to considerable doubt, authorities differing very considerably from one another; the opinion of Rose, that it varies according to its mode of preparation, seems most likely. It is stated that repeated sublimation diminishes the proportion of the sesquicarbonate in the condensed product. However, by the authority referred to by us recently in our article on standard solutions, etc., it is required that fifty-nine grains dissolved in an ounce of distilled water should be exactly neutralized by the 1,000-grain measure of the oxalic acid solution; 1.5 grain of it is also dissolved by seventeen grains of citric acid.

It is soluble in water at 13° C., in the proportion of twenty-five parts to one hundred; at 17°, thirty parts; at 32°, thirty-seven parts; at 41°, forty parts; and at 49°, fifty parts. At a higher temperature than the latter the salt is decomposed, carbonic acid being evolved, and a solution of the normal carbonate being left behind. Hence it is obvious that the solution kept for developing should not be made by boiling water. This solution when exposed to air gradually decomposes, the acid carbonate being produced; it should be kept in tightly-stoppered bottles, a little wax or paraffine melted over the stopper being a good safeguard for either the cakes or the solution if they are to be kept any length of time. We repeat it is most desirable to use only the clear, unchangeable pieces for solution, and if possible always to obtain the "volcanic ammonia."

The ammonia more commonly sold is liable to an impurity which is especially obnoxious to photographers—nothing less than hyposulphite of ammonia. When the sesquicarbonate is prepared from either a sulphate or a chloride containing a sulphate this impurity is most likely to be met with, and it is not always entirely got rid of by resublimation. It may be detected by the addition of nitrate of silver to a solution of the carbonate neutralized by acetic acid, the well-known white precipitate turning to black even in the dark easily showing the presence of the sulphuric acid. Such samples should be rejected entirely.—*British Journal of Photography*.

SEPARATION OF CRYSTALLINE SILICIC ACID.

By E. LAUFER.

THE author takes advantage of the property of phosphoric salt to dissolve metallic oxides at a melting heat, and to isolate silicic acid from silicates without attacking quartz. To the finely powdered material, weighed in a platinum capsule, phosphoric salt was added in a larger quantity than was required for the solution of the silicates supposed to be present, the crucible not being more than half full. It was gradually and cautiously heated in the air-bath, then melted, the heat being finally urged with the blast till the mixture was in tranquil fusion. The cold mass was easily separated from the crucible, and was then boiled for a length of time with dilute hydrochloric acid, washed by decantation, and filtered, the silicic acid being then extracted from the residue with boiling soda.

DETECTION OF BUTTER ADULTERATIONS.

By C. HUSSON.

THE author's process is too lengthy for a full description. He places in each of a number of test-tubes 10 grms. of the whitest castor oil, and adds to one 1 gm. of the sample to be examined, and to the others 1 gm. each of the various fatty matters with which the butter is likely to be sophisticated. The tubes are then plunged in the water-bath, and the appearances presented at different temperature are noted. The mixtures are then treated with cold alcohol at 90 per cent., the emulsions formed are filtered, the residue washed with more alcohol, and dried in a current of air. One gm. of tallow thus leaves a deposit of 1.20 gm., while pure butter yields only 0.70. The author also dissolves fats in equal weights of glycerine, heating, agitating, and treating the emulsion formed with an equal weight of alcohol at 90 per cent., and of ether at 66 per cent. The tubes containing these mixtures are placed in the water-bath, maintained at 25°, and the strata of liquid produced are examined. With pure butter the lower stratum is slightly opalescent, the more decidedly the more milk is shut up in its texture. With margarine lard, tallow, etc., this phenomenon is, of course, wanting. The tubes are afterward withdrawn from the water-bath, let cool to 18° or 20°, and the deposits produced are examined with the microscope.

ON BENZ-ERYTHREN.

By G. SCHULTZ.

THE author obtained benz-erythron among the products formed by passing benzol through an ignited tube. It is insoluble in water, almost insoluble in alcohol, scarcely soluble in boiling glacial acetic acid, and in cold benzole, though it is readily taken up by the latter solvent with the aid of heat, and crystallizes on cooling in small shining leaflets, which melt at 307–308°. It is not identical with Rasenack's parachrysen.