

ers have not yet done themselves much credit in offering a lantern for the use of workmen which is safe, convenient, and brilliant; but this matter cannot be treated now.

Storage is an important item. Generally, the lead chambers are in buildings forty-five to fifty feet high, the timbers resting on high brick piers, and the ground floors being either earth or plank. The notion prevailed at one time that economy required lofty and large rooms, but this is now conceded to be an error, and the considerable elevation from the ground can only be ascribed to the facilities for drawing off the acid by gravity. Prudent manufacturers are now requiring the space under the lead chambers to be left entirely vacant, but the chamber-house is apt to be a conglomeration in the basement of a carpenter shop, machine shop, storehouse for sulphur, and a convenient receptacle for lumber, old and unused machinery, workmen's clothing, empty wagons, and almost anything which cannot be placed more conveniently elsewhere, and sometimes a large heap of bags of nitrate of soda.

As a rule, underwriters have waged a very successful warfare against nitrate of soda, and probably the strongest chemical firm in Philadelphia now switches a car over a brick vault, mainly underground, and empties the bags through a scuttle. Nitrate of soda in bulk in brick buildings occasions no harm, and one superintendent says he manufactured powder in the interior of Pennsylvania and handled hundreds of tons of nitrate of soda without the least anxiety. This was used in making "giant powder," since saltpeter was too expensive. Yet it is in the bags that the main danger appears to lie. They are generally the perquisite of the superintendent, who formerly obtained seven cents a bag, then half that price, and now only two cents. Then, too, less nitrate is used in more economical manufacturing, and for the pittance of four cents a day the superintendent will wash the bags, dry them as best he can, and pile them in nitrate of soda storerooms or in some frame outhouse. When the attention of the proprietors is called to this matter, they nearly always order the bags to be thrown into the river as soon as emptied.

One manager, whose whole place is a model of neatness, says there is no danger from nitrate of soda kept in bulk on a brick floor, within brick walls, and under a tile roof. But it strongly resembles saltpeter in chemical constitution, and if fire is communicated to the bags and water is thrown thereon, a severe explosion will result. Incidentally, attention must here be called to the use of nitrate of soda by fertilizer mixers producing damp goods and an inferior fertilizer. These manufacturers often store nitrate of soda in frame buildings as carelessly as they do konite, sulphate of lime, or any harmless article.

The model acid works will be built of brick buildings with brick or cement floors on the ground; the steam-boiler and burner houses will each be detached. The burner plant will be built entirely free from the buildings, with commodious space on all sides, and the fumes will be received in a lined brick chamber before passing into the Glover tower, which will be a distinct structure. The brick chamber-houses will not exceed thirty-five feet in height, and will be fully detached. All roofs will have a framework of iron slats on iron trusses, the whole being well treated with an asphalt coating. The slates will be wired to the iron slats with fine copper wire. The location will be within corporate limits, affording the protection of a public fire department, and there will be a private fire pump with constant steam supply, a liberal arrangement of private hydrants, good supply of rubber hose on running reels, liberal supply of filled fire pails, a private brigade drilled twice a month, and an ample water supply independent of that afforded through corporation hydrants. In addition to night workmen, there will be a patrolman sending in signals from regular stations to a district telegraph station or to an electric clock. Lighting will be done by incandescent lights in chamber-houses and are lights in burner-houses. Such acid works might not contribute heavy premiums to insurance companies, neither would they greatly endanger contiguous property, but underwriters would find them decidedly more profitable than under present arrangements.

Neither are these ideas Utopian, for some of these favorable conditions can be found in various works, and the model construction in the future will combine the various elements conducive to safety.—*Insurance World*.

#### ADULTERATION OF SWEETMEATS.

ONE of the chief forms under which fruits are consumed is that of preserves. By this name is designated every dry or liquid jelly, and every marmalade or compound obtained by cooking fruits or their juices in concentrated sugar sirup. Such aliments should possess the taste of the fruit that forms the base of them, and be composed normally of crystallizable sugar, glucose, pectic acid, pectine, and the acids and essences that are peculiar to the species of fruit elaborated.

By very reason of the importance of this branch of industry, the manufacture has given rise to the most ingenious adulterations. The report of the Municipal Laboratory of Paris, for 1885, gives some important data upon this subject, to which it is well to direct the attention of chemists and consumers.

It frequently happens that the sweetmeats put upon the market are totally factitious, and contain not a trace of fruit. In 1879, Mr. C. Menier analyzed a so-called currant jelly, which was in reality formed of gelose, glucose, cochineal, and chemical essences. Any one of the five following elements may be adulterated: The fruit, the jelly, the saccharine materials, the coloring matter, and the flavoring.

The fruit is often factitious. Hassall states that in England there is carried on an extensive manufacture of orange marmalade out of turnips, and of preserved apricots out of pumpkins.

Jelly, which was formerly made from gelatine, is now manufactured out of certain algæ. A jelly is also obtained by treating certain plants—especially carrots—with boiling water and adding starch to them.

The adulteration of saccharine materials is not very important. They are replaced by artificial glucose, which has the inconvenience of not being very sweet, but which is far from being unwholesome.

The coloring matters are the objects of reprehensible

frauds, cochineal, archil, saffron, hollyhock, pollen, etc., having often been detected.

But it is especially the flavor characteristic of the different fruits that is often imitated, this being done by means of "bouquets" that are entirely chemical.

The composition of some of these is as follows:

##### Essence of Plum.

Glycerine.....	8 parts.
Acetic ether and aldehyde.....	5 "
Oil of persico.....	4 "
Butyric ether.....	2 "
Formic ether.....	1 part.

##### Essence of Currant.

Acetic ether.....	5 parts.
Tartaric acid.....	4 "
Benzoic acid.....	1 part.
Succinic acid.....	1 "
Benzoic ether.....	1 "
Aldehyde and cœnanthic acid.....	1 "

##### Essence of Raspberry.

Acetic ether.....	5 parts.
Tartaric acid.....	5 "
Glycerine.....	4 "
Aldehyde.....	1 part.
Benzoic ether.....	1 "
Amylbutyric ether.....	1 "
Cœnanthic ether.....	1 "
Nitrous ether.....	1 "
Sebacic ether.....	1 "
Succinic ether.....	1 "
Formic ether.....	1 "
Butyric ether.....	1 "
Acetic ether.....	1 "
Methylsalicylic ether.....	1 "

##### Essence of Pineapple.

Amylbutyric ether.....	10 parts.
Butyric ether.....	5 "
Glycerine.....	3 "
Aldehyde and chloroform.....	1 part.

##### Essence of Melon.

Sebacic ether.....	10 parts.
Valerianic ether.....	5 "
Glycerine.....	4 "
Butyric ether.....	3 "
Aldehyde.....	2 "
Formic ether.....	1 part.

##### Essence of Apple.

Aldehyde.....	2 parts.
Amylvalerianic ether.....	10 "
Chloroform.....	1 part.
Acetic ether.....	1 "
Nitrous ether.....	1 "
Oxalic acid.....	1 "
Glycerine.....	4 parts.

##### Essence of Pear.

Acetic ether.....	5 parts.
Amylacetic ether.....	1 part.
Glycerine.....	1 "

##### Essence of Cherry.

Benzoic ether.....	5 parts.
Acetic ether.....	5 "
Glycerine.....	3 "
Cœnanthic ether.....	1 part.
Benzoic acid.....	1 "

##### Essence of Peach.

Formic ether.....	5 parts.
Valerianic ether.....	5 "
Butyric ether.....	5 "
Acetic ether.....	5 "
Glycerine.....	5 "
Oil of persico.....	5 "
Aldehyde.....	2 "
Amylic alcohol.....	2 "
Sebacic ether.....	1 part.

##### Essence of Apricot.

Butyric ether.....	10 parts.
Valerianic ether.....	5 "
Glycerine.....	4 "
Amylic alcohol.....	2 "
Amylbutyric ether.....	1 part.
Chloroform.....	1 "
Cœnanthic ether.....	1 "
Tartaric acid.....	1 "

In order to preserve these falsified products (not always an easy thing to do, on account of the complex materials that enter into their composition), antiseptics, such as boric, salicylic, and oxalic acids, are added to them in large proportions.—*Le Génie Civil*.

#### SEPARATION OF ZINC FROM ALL THE METALS OF ITS GROUP.

By W. HAMPE.

FOR separating zinc from iron, nickel, cobalt, manganese, and aluminum, the author recommends the conversion of the metals into formates, and the treatment of the solution with sulphureted hydrogen. While the zinc is completely precipitated, manganese and aluminum, nickel, cobalt, and iron, are said not to be thrown down, provided that the solution contains a sufficiency of free formic acid (at least 15 to 20 c. c. of acid at 1.2 sp. gr. to 250 to 500 c. c. of liquid), and that such metals are not present in too large quantity. Otherwise traces of foreign sulphides accompany the zinc sulphide, and their presence may be easily known by the reddish-brown color of the precipitate. Iron falls most easily in this method, nickel and cobalt less readily. These impurities are quantitatively very trifling. For their entire removal the filtered and washed precipitate is dissolved in nitric acid, supersaturated with ammonia, then with formic acid, and finally reprecipitated with hydrogen sulphide. Such a repetition of the precipitation—though by no means invariably necessary—would deprive this method of its chief advantages if there were not a means of making the zinc-sulphide capable of rapid and easy filtration. To this end Hampe passes hydrogen sulphide into the hot solution, zinc sulphide is then deposited as a granular sulphide, which admits of rapid and clear filtration and washing. As washing-liquid he uses sulphureted hydrogen water, to which have been added a little ammonium formate and formic acid.

On passing hydrogen sulphide into the hot solution a little zinc sulphide—perhaps 1 milligram—is deposited so firmly on the side of the beaker that it cannot be rubbed off. After rinsing out the glass this film is dissolved in a little nitric acid, and the solution is joined to the main quantity if the precipitation is to be repeated. If this is not necessary, the nitric solution of that film is mixed with ammonia and ammonium sulphide, and formic acid is then added until the reaction is acid. The mixture is then poured upon the washed precipitate on the filter.

When dry the zinc sulphide is not horny and brittle, like that precipitated from an acetic solution, but pulverulent. Hence it can easily be detached from the filter without fear of loss.—*Chemiker Zeitung und Zeitschrift f. Anal. Chemie; Chem. News*.

#### THE SEPARATION OF THE CINCHONA ALKALOIDS.

By Y. SHIMOYAMA.

FOR the determining of the quinine in the mixture of alkaloids obtained by extraction, the author places at least 0.5 gm. in a beaker, and dissolves it at a gentle heat by the addition of a minimum of very dilute acetic acid in 30 to 40 c. c. of water. When the solution is cold, it is filtered into a tared beaker, the filter carefully washed, and the filtrate neutralized with a very dilute soda-lye. If any insoluble substance separates out, the liquid is filtered through the smallest possible filter, and the filtrate is mixed with a suitable proportion of a solution of sodium oxalate saturated at 18°. One c. c. is required for every 0.1 gm. of the mixture of alkaloids taken for analysis. The liquid is evaporated on the water-bath down to 8 to 10 grms., until a distinct separation takes place on cooling. From 10 to 15 c. c. of water are then added to the contents of the beaker, and the whole is stirred until the smeary mass which separated out along with the precipitate of oxalate is completely dissolved. The beaker is then set aside for three hours at 18°, stirring frequently. The weight of the contents of the beaker is determined, the precipitate is filtered upon a double filter, washed several times, with the aid of a filter pump, with a solution of quinine oxalate saturated at 18°, rinsed with 50 c. c. of a saturated solution of quinine oxalate into a capacious flask, well shaken for 15 to 20 minutes, and set aside for two hours at 18°, shaking from time to time. The precipitate is collected upon a double filter, which has been dried at 110°, and weighed and washed with a saturated solution of quinine oxalate, using a filter pump. The moist filter with the precipitate is weighed between watch glasses to ascertain the quantity of the saturated solution of quinine oxalate contained in it, dried for three hours, and weighed again. If for every gm. of the difference of weight ascertained (quantity of water of the saturated solution of quinine oxalate) we deduct 0.00069 gm. from the obtained quantity of dry quinine oxalate, we obtain the quantity of the precipitated quinine oxalate. If the latter is subtracted from the ascertained weight of the contents of the beaker, we find the weight of the mother-liquor. By multiplying its weight in grms. with 0.00064, we obtain the quantity of the quinine oxalate which remains in solution in the mother-liquor, which must then be added as a correction to the weight of the separated salt. One gm. quinine oxalate represents 0.878 gm. quinine. In the determination, the above mentioned temperature must be carefully adhered to, as even small fluctuations of heat produce considerable differences in the results. If the total quantity of the alkaloids contains only 20 per cent. of quinine, the separation of the oxalate sometimes only begins after two to three hours. For the complete separation of the quinine oxalate, it is important to stir the liquid frequently. If the quinine is less than 20 per cent. of the total alkaloids, this method is not applicable.—*Archiv der Pharmacie und Zeitschrift für Analyt. Chemie; Chem. News*.

#### QUALITATIVE DETECTION OF FATTY OILS IN MINERAL OILS.

By F. LUX.

IF ordinary rape oil is heated with potassium, sodium, or solid potassium or sodium hydroxides, saponification ensues, which is in general promoted by agitation. At the temperature of 100°, and a time of action of about thirty minutes, there is formed in case of potassium, sodium, and sodium hydroxide some flocculent soap like matter; the oil, on cooling, remains mobile. Potassium hydroxide occasions no change.

If the oil is heated for thirty minutes to 150°, potassium and sodium occasion the formation of a soapy matter, and the oil remains thin on cooling. Potassium hydroxide yields a plentiful flocculent deposit which thickens the oil. With sodium hydroxide there is little deposit, a part of the soap formed dissolving in the oil, which thus begins slightly to gelatinize.

If the mixture is heated for twenty minutes to 200°, the potassium is more thickly covered with flakes of soap, the oil remains liquid; sodium is similarly coated, and at the same time the oil begins to gelatinize on cooling. With the hydroxides there is abundant saponification, and the oils on slightly cooling congeal to turbid, tough masses.

If submitted to a temperature of 250°, rape oil gelatinizes perfectly, even in five minutes, alike with potassium, sodium, and their oxides. The soap as it is formed dissolves at once, and the globules of potassium and sodium retain a metallic lustre. In fifteen minutes the saponification has progressed further, while in case of potassium, sodium, and potassium hydroxide there sets in an incipient decomposition, which is recognized by the darkening and even browning of the oil. The oil which is in contact with these three agents congeals to a brown butter-like mass. Oil in contact with sodium hydroxide congeals to a hard yellowish white mass which does not darken.

Pure mineral oils, if treated in a similar manner, turn, as a rule, rather darker, but undergo no perceptible change in their state of aggregation.

Upon these observations the author founds a process for detecting admixtures of mineral oils with fatty oils. Forty series of experiments were made to test the method, the materials used being rape, linseed, and olive oils, with ordinary petroleum and two distinct lubricating oils. One of these latter (A) was thick,