ICE A NECESSITY.---HOW IT IS OBTAINED IN QUANTITY.

As a class, man is proverbially ungrateful. Those comforts which lighten his labors, day after day, he regards as matters of course, and gives not one single thought in gratitude for the enjoyment consequent upon them, nor one single reflection upon the care and labor expended in order that he may enjoy them. Little does he think, while sipping his ice water, after a day of toil under a sun high in heaven, and with the thermometer far up in the nineties, of the immense amount of labor expended a few months before in gathering and storing that substance which shall render his water palatable. Now that the hot season is once more upon us, it may not be inappropriate to give within the space of a short article, a description of the process of gathering the immense crop of ice which is necessary to supply the demands of sweltering humanity in our cities.

When we consider that seventy years ago ice in cities was deemed a rare luxury during the summer, and it was only within the power of the wealthy to pay the prices demanded,it must be conceded that the increase in its consumption and decrease in price have been wonderful, when, today, rich and poor alike demand it as one of the necessities rather than the luxuries of life. In the city of New York, seventy years ago, a few tuns satisfied the demand; for consumption during the present season, in this city alone, 1,000,000 tuns have been harvested, engaging the energies of six companies with an aggregate capital of $4,000,000; in its transportation and delivery, employing forty barges, five steamers, three hundred wagons, five hundred horses, and seven hundred men.

Many of the ice houses, in which the ice is stored until needed, are built of brick, with double, triple, or even quadruple walls, the spaces between the walls being filled with sawdust or some like substance. They are from 200 to 400 feet long and from 100 to 200 feet wide, and are sometimes three and four stories in hight. Airtight doors close each floor.

A proper time having arrived for the gathering of an ice crop, all is hurry and bustle. No time is to be lost, and here we fully comprehend the truth of the maxim that "time is money;" as the ice companies may be obliged to content themselves with but one crop of ice, everything depends upon the haste with which it is gathered, for should an unpropitious change take place in the weather, thousands of dollars' worth will be lost. All day long the men are as busy as bees, and, should the night be clear and the moon gracious, no respite is given, and the dawning of another day sees the work being carried hurriedly on. The ice field having been fenced in and the snow scraped off, the ice is planed to a depth of two or three inches to remove the porous ice coating from the solid mass beneath. A machine called a marker, drawn by horses, then cuts narrow grooves five feet apart over the whole length of the field; these are crossed by similar grooves, dividing the field into squares; these grooves are deepened and the squares made smaller by a harrow having three rows of teeth two feet apart. One row of blocks having been separated from the field by means of a hand saw, it is lifted upon the surface and hurried to the house. Rapidly a gang of men pry off the blocks with crow bars; the blocks are elevated upon an inclined plane, lowered into the house, and packed in sawdust, bran, shavings, or bark. As soon as one story is filled, the doors are closed, the next story is treated in the same manner, and so on, until the house is filled, when it is closed, not to be op ned until the ice is needed. The ice is handled as little as possible, for like riches, with much handling it may take to itself wings and fly away.

SCIENTIFIC INTELLIGENCE.

EXPLOSIVE ACTION OF OZONE.

A number of mysterious explosions of various nitrogen compounds have attracted the notice of chemists, and some experiments have been instituted with a view to an explanation of the phenomena. It has been found that nearly all of the mixtures composed of nitrogenous substances and used as explosives, are decomposed with more or less violence by ozone. A powder in which picric acid was a constituent, caused great damage in the laboratory where it was made, in consequence of the action of ozone. At first the cause of he accident was inexplicable, but careful research traced it o the ozone in the atmosphere.

Nitro-glycerin is at once decomposed by ozone into nitric acid and other compounds. Gun cotton is also destroyed, sometimes with explosive force, and so on through the list of explosive compounds. An extension of these researches may eventually afford an explanation of the spontaneous decomposition of certain bodies, and may suggest precautions to be observed to prevent a recurrence of the accidents; and it has been suggested that a new test for ozone might be found in this way.

USE OF GLYCERIN IN TESTING FOR GRAPE SUGAR.

Glycerin possesses the property, in the presence of soda or potash, of dissolving a considerable quantity of hydrated oxide of copper. On this account, the alkalies do not give a precipitate from copper solutions to which glycerin has been added. Hence the copper solutions for testing for grape sugar can be advantageously prepared with a small proportion of glycerin, as they can be rapidly made, do not easily decompose, and withstand the action of diffused light. A standard solution can be prepared as follows: Dissolve 16 grammes pure sulphate of copper (blue vitriol) in 64 grammes of water, and gradually add 80 cubic centimeters caustic soda, specific gravity 1·34 (about 112 grammes), and then add, with constant agitation, 6 to 8 grammes pure glycerin, until the liquid is clear. It would be possible to prepare a solution, in this way, of a fixed value for the quantitative determination of grape sugar, and such a method could be applied to the analysis of cane sugar by converting the latter into grape sugar, previous to making the test.

DEATH OF PROFESSOR PAYEN.

Professor Anselme Payen died recently in Paris at the advanced age of seventy six, having been born January 17, 1795. After completing his studies, he was one of the first persons to appreciate the importance of the beet sugar manufacture to the prosperity of France, and early became a director of one of the largest sugar refineries. Afterwards he assisted in the foundation of several important chemical works, until he was called to the chair of applied chemistry at the *Conservatoire des Arts et Métiers* in Paris, where he devoted the remainder of his days to instruction by lecture and laboratory practice, and where he wrote his numerous papers on applied science, and prepared his learned work on the application of chemistry to the arts. He was long an authority in all matters of the application of science to the wants of man; and his own investigations were among the best contributions the French have made to this branch of knowledge. We remember him as an urbane, kind man, always ready to lend a helping hand to those who applied to him, an admirable specimen of a scientific teacher. He remained at his post during the recent siege of his native city, and took an active part in the food discussions at the meetings of the Academy. His health was not perceptibly impaired, but the strain appears to have been too much for his overworked brain, and he died suddenly of apoplexy. His death will be severely felt at the institution where he has so long and successfully labored, and the scientific world in general will regret to lose one of its most active and useful members.

NEW TESTS FOR PETROLEUM.

Good petroleum should possess the following characteristics:

1. The color should be white or light yellow with blue reflection; clear yellow indicates imperfect purification, or adulteration with inferior oil. 2. The odor should be faint and not disagreeable. 3. The specific gravity at 60° Fah. ought not to be below 0·795 nor above 0·804. 4. When mixed with an equal volume of sulphuric acid of the density of 1·53, the color ought not to become darker, but, on the contrary, lighter. A petroleum that satisfies all of these conditions and possesses the proper flashing point may be set down as a pure and safe article.

SILVERING GLASS.

The various methods invented by Liebig, Bothe, Böttger, and others for depositing silver upon glass have been considerably modified and improved by Krippendorf, in Switzerland, and we give below a condensed statement of the latest improvements introduced by him. The following are the labels required for the materials to be used in silvering glass:

1. Seignette salts; that is, tartrate of soda and potash.
2. Solution of seignette salts in the proportion of one gramme to fifty grammes of distilled water.
3. Caustic ammonia, fifty cubic centimeters.
4. Solution of nitrate of silver, 1·8.
5. A flask of 1,000 cubic centimeters capacity for the reducing liquid.
6. A second flask of same size for the silvering solution.

With the help of the above chemicals and flasks, the two normal solutions, viz.: (1) the reducing liquid; (2) the silvering liquid can be prepared in the flasks (5 and 6).

1. The normal reducing solution: 900 cubic centimeters (grammes) distilled water are mixed with ninety cubic centimeters seignette salts solution (2) and the mixture brought to boiling over a suitable fire. During the boiling of the liquid, by which considerable steam is evolved, twenty cubic centimeters of the nitrate of silver solution are added from No. 4, by which the whole liquid is blackened. The whole is allowed to boil for ten minutes until the so called oxytartrate of silver is formed, when the reducing liquid is ready for use. This normal liquid can be preserved any length of time; in fact, it seems to improve by age. It can be kept in flasks, and when required for use must be carefully filtered. Experience has shown that it is better to prepare the normal reducing liquid in a flask rather than in a capsule.

2. The normal silvering liquid: Nitrate of silver is dissolved in water, and ammonia gradually added until the brown precipitate is nearly all dissolved, then filtered, and diluted until there is one gramme of nitrate of silver in 100 cubic centimeters of the liquid. For those who are not chemists, it is as well to take 900 cubic centimeters distilled water, add eighty cubic centimeters of the silver solution from No. 4 (1·8) and afterwards 100 drops caustic ammonia from No. 3.

3. The silvering process: Equal volumes of the liquids (1) and (2) are carefully and separately filtered and afterwards poured together into a vessel of the proper size, and the well cleaned glass plate introduced. In about ten minutes a decomposition of the mixture begins to take place, indicated by a blackening of the surface, and pure metallic silver will be deposited upon the plate. The introduction of the plate and the cleaning of it take place precisely as in photographic operations, otherwise irregular lines and unequal deposits of silver result. Gentle heat and sunlight facilitate the operation, while cold and darkness retard it. Finally the plate is removed from the vessel, rinsed with pure water, and varnished or otherwise protected by a background. Good photographic varnish can be recommended for coating the film. For bath, after the operation, contains fifty to sixty per cent of the original silver, which can be reclaimed as chloride by the addition of hydrochloric acid. Hollow ware, reagent bottles, and test tubes are silvered by simply pouring in the solutions (1) and (2) in the same way as described above. The silvering the interior of large flasks, it is well to introduce a small quantity of the liquid at first, and to turn it rapidly around until the surface is covered with a thin deposit. Treated in this way, the operation becomes a very simple one, and may lead to the introduction of silver mirrors as substitutes for quicksilver glasses for very many purposes.

The New Railroad Depot at Forty-second Street and Fourth Avenue.

Among all our large commercial buildings, the railroad depots are those of which New Yorkers have least cause to be proud. Discomfort, shabbiness, and dirt, concentrated in ill-ventilated structures, have generally hitherto been all the accommodation to the public that our railroad kings have seen fit to give. But at last a building has been erected, where space for business, order and discipline in arrangement, ample ingress and egress, and substantial elegance of interior and exterior, are provided. This is the new Union depot, corner of Forty-second street and Fourth avenue, and it is intended to be the New York terminus of the New York Central and Hudson River, the New York and Harlem, and the New York and New Haven lines, which are all, directly or indirectly, under the control of Commodore Vanderbilt.

The building is nearly 800 feet in length by 240 in width, and is thus about four acres in floor area. The crown of the arched roof is over 100 feet from the ground; and the iron and glass of which the roof is built, and which is now the universal system of roof building for railroad purposes, inur e to the depot plenty of light and an airy and pleasant appearance. Offices for the transaction of the business of the three roads, well built and decorated, are exterior to the depot itself, and face Forty-second and the adjacent streets; and waiting rooms, with restaurant adjoining, and toilet accommodation are also provided.

Telegraphic communication is made from the depot master's office to all the switches, and the centralization of all the switch arrangements will be found to prevent the numerous slight accidents which often occur in and about a railroad depot, accidents of which the public hears nothing, but which add greatly to the expenses of a railroad. To these well designed and costly arrangements, it will be necessary to add a well disciplined, courteous, and business like staff of clerks, porters, and attendants; and the traveling public will appreciate the convenience of the new terminus, and one of our railway presidents will have got rid, as far as he is concerned, of a lasting reproach to New York.

Munroe's Refrigerator.

In this refrigerator, a box or outer casing, made of wood and of any convenient or required form, size, and proportion, contains a porous vessel, either made in a single piece or in slabs or pieces of any material (preferably of kaolin), but of any mineral or other substance which possesses the required degree of porosity. The outer surface of this porous vessel or evaporating medium is corrugated, to present a more extended evaporating surface, or it may be made with double walls or projecting wings, or in any form for the same purpose. It has a channel or gutter around the top, either continuous or in sections, into which water or other liquid is placed. This liquid is absorbed by the porous vessel, so that the latter becomes saturated with the moisture. Any water or liquid which may drip from the vessel or evaporating medium is caught by a hopper shaped false bottom and conducted into a watertight drawer, whence it may be dis charged at pleasure through a faucet. The vessel or absorbing and evaporating medium is supported above the drip bottom in any suitable and substantial manner, any device being employed which will not obstruct the current or cur rents of air from passing up or down entirely through the refrigerator. Between the casing and the evaporating medium is an open space on each side, which open space extends from the top entirely through, and in the top are orifices for the admission or discharge of air. In practice the air current is downward, and the more rapid the evaporation of the liquid or moisture, the stronger will be the current of air. The evaporating vessel is lined on the outside with zinc or other metal, but preferably with some mineral composition, cement, or plastic material, either waterproof in itself or used in combination with a waterproof coating on the vessel, so that moisture shall be entirely excluded from the preserving chamber. By this means the use of ice is dispensed with. The temperature in the preserving chamber is, the inventor claims, readily reduced to 40° in the hottest weather. In fact the temperature is more readily reduced in hot than in moderate weather, as the evaporation will then be more abundant. The improvement applies not only to refrigerators for family use, but to refrigerating compartments on board of vessels or on railroad cars for the transportation of meats, fruits, and vegetables. The motion of such vessels or cars will produce currents of air, which might be conducted to the absorbing and evaporating medium, and utilized in maintaining a low temperature in a preserving chamber. Lateral as well as vertical currents may be employed, and the air may be forced in contact with the evaporating medium by a blower or otherwise, as may be found most convenient, or as circumstances may dictate. This apparatus is the invention of Charles E. Munroe, of Cambridge, Mass.

GLUE KETTLES.—A few holes, bored in a glue kettle, in a horizontal line near the rim, will allow steam from the boiler to enter the kettle, and so prevent the glue from solidifying on the side. The holes need not be bored all round the kettle, as it is handy to be able to pour glue out of one side without wasting it.