Tartaric and Citric Acids.

Tartaric acid, when pure, is in colorless, inodorous, very sour crystals. It is soluble in two parts of water, and also in alcohol. The watery solution has no smell, is perfectly limpid, and is very acid. The specific gravity is 1·59 and 1·75. Heated on a piece of metal over the flame of a lamp, it swells up, emits a very peculiar smell, and leaves a porous coal. The solution exposed to the air very soon mildews on the surface and turns to vinegar.

The composition of pure anhydrous tartaric acid is: Carbon, 36·49; hydrogen, 3·02; oxygen, 60·58 parts in one hundred, but the crystals always contain 11·84 per cent of water.

Tartaric acid is manufactured from cream of tartar (bitartrate of potassa), which latter, as we have stated in a previous article, contains 70·18 per cent of this acid. The mode of its preparation is fully described in all recent works on chemistry applied to the arts and manufactures.

It is frequently adulterated by admixtures of cream of tartar, bisulphate of potassa or lime. These are readily detected as follows;

1. The acid, if pure, dissolves without leaving the slightest sediment.

2. Alcohol must dissolve the whole of the crystals, leaving no undissolved portion.

3. After calcination, lime can be detected in the ash by its effervescing if a drop of any strong acid be allowed to fall on it.

4. Sulphureted hydrogen, sulphate of lime solution, or chloride of barium introduced into a solution of pure tartaric acid, will cause neither cloudiness, change of color, nor deposit.

The uses of tartaric acid are many, large quantities being annually consumed in the manufacture of lemonades, soda waters, and other sparkling drinks, where it replaces advantageously the more expensive "citric" acid. It is also much employed by calico dyers as a special mordant.

In conclusion we will only mention that tartaric acid combines with some other substances, forming what are called "tartrates" and "bi-tartrates," many of which are valuable in the arts or in the practice of medicine.

Tartaric acid itself, finds a place in the phamacopœia.

Citric acid is found in the juices of many plants, but in none is it more plentiful than in the fruit of the lemon and its allies.

In a pure state it forms transparent, scentless, rhombic crystals, which do not alter by exposure, and have a very acid flavor. The specific gravity is 1·617. It is soluble both in water and alcohol. Dry heat soon destroys it.

Citric acid is largely used in bleaching establishments and laundries for removing rust and ink stains, and by the dyer for intensifying many red colors. The best class of artificial lemonades and sparkling acidulated drinks and powders are made from it.

Accidental impurities are, sulphuric acid and salts of lead; they are not, however, of frequent occurrence.

The "trade" adulterations are with oxalic acid, tartaric acid, and occasionally sulphate of lime.

Tartaric acid and oxalic acid, from their low prices and somewhat similar aspect and flavor, are generally found mixed in proportions varying from 30 to 80 per cent with the commercial citric acid. For the detection of this adulteration, dissolve your sample in water and add gradually, stirring all the while, a solution of sulphate or carbonate of potash. If the citric acid be pure, no deposit whatever will show itself, but if it contain either tartaric or oxalic acids, a white crystalline precipitate of tartrate or oxalate of potash will fall to the bottom and tell the tale at once.

Citric acid is manufactured from the juice of lemons, limes, citrons, and other similar fruits. Lemon juice is frequently brought to market in barrels or in bottles from the warm countries where the tree prospers. It is used in its natural state for many domestic purposes, and also by the dyer in his profession.

Lemon juice must be carefully clarified, as by neglect of this operation it will be sure to undergo fermentation and to acquire a very unpleasant odor and disagreeable taste. It is often largely adulterated by the addition of water, besides which, vinegar, sour grape juice, citric acid, muriatic acid or tartaric acid, and sometimes several of these combined, are not unfrequently added to it.

The detection of these admixtures needs the practical science of the analytical chemist.—*New York Mercantile Journal.*

Hyacinth Culture.

Many of our readers just now will be thinking of growing that beautiful winter flower, the hyacinth. A few hints given by a correspondent of the *Journal of Horticulture* may prevent failure, and consequent disappointment, in not a few cases. He says:

"I annually grow about eighteen hyacinths in glasses, and invariably place them all in water at the same time. I have tried different times in the hope of insuring a succession of bloom, but it has happened that those placed latest in the glass were among the first to bloon. I have also ceased to put the bulbs in the water so early as I used, and now do not think of putting them in till the middle or end of October. Fresh rain water is to be preferred, and the glass should be so filled that the water only just touches the base of the bulb. Rain water should not be employed unless it is quite fresh, or otherwise it soon becomes putrid, and causes the roots of the bulbs to decay. If there is no alternative but to employ hard water, if it can be exposed to the action of the sun or external air for a time, so much the better.

"My experience has taught me that hard water used directly after it is taken from the well is apt to cause the roots to become a mass of pulp, highly offensive, and fatal in its effects. Two or three lumps of charcoal placed in the glasses about two or three days before they are occupied by the bulbs, in order to allow of the charcoal becoming saturated and sinking to the bottom, will keep the water from turning rank, and prevent the necessity for its being often changed. Some of my best flowers have been in glasses, the water of which was not once changed. Place the glasses in a dark and rather cool situation until the roots have nearly reached the bottoms of the glasses, when they can be brought to the light.

"A month or six weeks' imprisonment will bring the roots to this stage of development. The most airy and lightest part of a sitting room, but as far from the fire as possible, is the best position for them. When the bulbs have been in the water about a week or ten days, the base of each should be examined, and any decaying or slimy substance removed. As the shoot of growth increases in size, evaporation will take place, therefore the water should be replenished at intervals, care being taken that what is supplied is not lower in temperature than that in the glass. The foliage of the plants should be kept scrupulously free from any dust or dirt; a small piece of sponge will remove this with but very slight trouble. When the flower spikes begin to show themselves the glasses should be kept filled to the rim with water, as at the point of flowering the bulbs absorb a great quantity of moisture."

Monckhoven's New Artificial Light.

Dr. Desire van Monckhoven recently demonstrated satisfactorily its importance before a meeting of the Vienna Photographic Society, and delivered a lecture upon its mode of application.

One of the most intense lights to be obtained by oxidizing metals or metallic compounds at a high temperature, is that derived from chloride of titanium, or chloro-chromic acid, when exposed to the action of an oxy-hydrogen flame; the light thus produced is of high actinic power, and capable of blackening chloride of silver paper to an appreciable degree in thirty seconds, the formation of titanic acid or chromic acid being brought about at a very high temperature. It is this description of light that has been chosen by Dr. M.

Several kinds of oxy-hydrogen lights have been devised from time to time; the Drummond light, in which the flame acts against a cylinder of unslaked lime, but which requires the constant presence of carbonate of lime, and the surface of the cylinder to be continually changing; the Tessie du Motay light, in which the lime cylinder is replaced by means of a compressed magnesia or zirconia cylinder; and the Carlevaris light, consisting of small parallel pipes of hard charcoal moistened with chloride of magnesium. Of all these lights that of Drummond is the best, and by substituting for the lime cylinder another composed of titanic acid, magnesia, and carbonate of magnesia, a suitable illuminating power is obtained. A cylinder of this description, measuring three centimeters (1 inch) broad and nine long (3 inches) lasts for three hours, and may be produced for the sum of threepence. Instead of hydrogen, ordinary coal gas is employed; and for the supply of oxygen, M. Deville's method of obtaining it by heating a mixture of calcined peroxide of manganese and chlorate of potash is employed.

Hoosac Tunnel.

The new railroad bridge across the Deerfield river, at the east end of the Hoosac Tunnel, has been completed, and the rock from the tunnel is now deposited on the other side of the river. The work at the west end of the tunnel progresses rapidly. Last week forty-three feet were completed, being twenty feet more than during any week under the State management. Messrs. Shanly & Co., are the contractors. The Burleigh drills are used exclusively at this tunnel, but with compressed air as the motor. The air is condensed three atmospheres, by means of Burleigh's air compressors, operated by steam power, and the condensed air is carried nearly two miles in an iron pipe before it operates upon the drills. The air which exhausts from the drills gives perfect ventilation within the tunnel.

The progress made at the Hoosac Tunnel is nearly one third greater than at Mont Cenis, notwithstanding the supposed superior and the costly nature of the French machinery

THE FIRST MAN WHO HAD CHARGE OF A LOCOMOTIVE IN THE UNITED STATES, turns out to be, not Nicholas Darrell, as stated on page 326, current volume, in an article copied from the *Rural Carolinian*, but John Degnon, 48 First street, New York. We had the pleasure of a call from Mr. Degnon a few days since, and he explained to us that he was the man who took charge of the *Best Friend* on its way to Charleston, and that he ran this locomotive three months or thereabouts, meanwhile giving Mr. Darrell the necessary instructions to qualify him for the post. The following year he executed a similar commission with a second locomotive. In proof of his statement, Mr. Degnon referred us to Horatio Allen, and other prominent engineers and manufacturers of this city. "Honor to whom honor is due."

GERMAN TINDER.—Amadou, punk, or German tinder, is made from a kind of fungus or mushroom, that grows on the trunks of old oaks, ashes, beeches, etc. It should be gathered in August, or September, and is prepared by removing the outer bark with a knife, and separating carefully the spongy, yellowish mass that lies within it. This is cut into slices, and beaten with a mallet to soften it, till it can easily be pulled asunder between the fingers. It is then boiled in a strong solution of saltpeter.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

E. N. B., of Ottawa, Ca.—No method of trisecting an angle based upon principles of plane geometry has ever been discovered, though many attempts have been made. Believing the problem impossible, the prizes offered at one time by several learned societies for its solution have all been officially withdrawn, notwithstanding ambitious geometers are still busying themselves with the problem. An attempt at its solution, recently made by Patricio M. Del. Rio, ex-professor in the Peruvian Naval Academy, has been recently published, but it has since proved to be erroneous. You will find immortal fame sooner in other pursuits than in muddling your brains with this question.

J. M., of S. C.—No simple rule has ever been found for determining the size of a second pulley, only the distance between centers, length of belt, and diameter of first pulley being given. A solution has, however, been sought by eminent mathematicians. The problem is extremely difficult, and involves the higher mathematics for even an approximate solution. The practical and proper way to work is to fix the size of both pulleys and determine the length of belt accordingly; and actual measurement is the readiest way to determine the length of a belt when the diameter of the pulleys in which it is to run are given.

J. W. M., of Ind.—The best varnish we know for the preservation of a portable boiler liable to rust through exposure to out-door influences is asphaltum. This substance readily dissolves in turpentine, which forms a good vehicle for its application. We presume you can obtain it ready mixed.

J. W. M., of Pa.—Nails are made of any size ordered, provided the order is large enough. We do not know whether the size you mention is kept on hand or not by any dealers, but are inclined to think it is not.

W. B. L., of Vt.—There is no cheap metal that will withstand the action of salt water. You can obtain all kinds of rubber tubing from any dealer in rubber goods.

R. A. C., of Ky.—You can render brittle sheet brass tough by annealing, that is, heating it and plunging it in cold water.

G. S. R., of Mass.—There is no gain in using high steam for heating purposes. The total amount of heat in steam at any pressure is found by adding the latent heat to the sensible heat or temperature, and this is practically a constant sum for all pressures.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.