Testing the Strength of Acetic Acid.

In attempting to determine the strength of acetic acid by means of the hydrometer, it will be remarked that certain anomalies present themselves: thus, there is no difference in the specific gravities of acids containing respectively 53 and 100 per cent of true acetic hydrate, both having precisely the same density, 1063, at 60° Fahr. (water = 1,000). The heaviest liquid acid is that containing 80 per cent., the specific gravity of which is a trifle over 1073; but from this point upwards to the acid of 93 per cent., there is no appreciable difference in the gravity. Again, a sample weighing 1037 may either represent an acid of 60 per cent., or may contain as much as 98 per cent of true acid. It is, therefore, customary to guarantee the highest degree of concentration by specifying the temperature at which the acid becomes solid, or, rather, the highest point at which the already glacial acid resists liquefaction. Another guide which may often prove serviceable in the identification of an acid which, although of a high degree of concentration, is not actually glacial, is the fact observed, we believe, independently by M. Berthelot and Mr. E. Chambers Nicholson, that such acid becomes inflammable when the temperature is raised to the boiling-point, it will be found that the vapour takes fire on applying a lighted match, and burns steadily as long as the ebullition is maintained; if, however, 10 per cent. of water be mixed with the sample there will be a great difficulty in causing inflammation, and the vapour when ignited will only burn with a lambent flame of pale blue separated cones, whilst below this strength the acid vapour is altogether uninflammable. By this test, then (avoiding a too prolonged ebullition, which increases the strength of a weak acid), we have a ready means of estimating the quality of liquid samples of a high degree of concentration without restoring to the more tedious method of acidimetry. It has only to be stated, in conclusion, that the boiling-point of the ordinary qualities of acetic acid, although higher, is so little removed from that of water that the indications of the thermometer are not much more to be relied upon than those of the hydrometer. In many respects carbolic acid imitates the deportment of acetic acid in the characters above described; it likewise becomes glacial upon separation of the last traces of water.—*Photographic Journal.*

The Manufacture of Glycerine.

Glycerine is the base of fat, as lime is the base of marble; potash, the base of saltpetre; soda, the base of Glauber's-salt, etc. The other constituent of the fat is one or more acids, as carbonic acid is that of marble; nitric acid, that of saltpetre; sulphuric acid, that of Glauber's-salt, &c. The names of these fatty acids are stearic, margaric, and oleic; they are present in different proportions in different fats. Stearic is the most solid, and is the material from which the so-called stearine candles are made; margaric acid is softer, and oleic acid is fluid, like oil.

To separate the glycerine, it was formerly supposed to be necessary to convert the fat into soap. Soap is a compound of an alkaline base with a fatty acid; potash and soda give soaps soluble in water; lime and oxide of lead give soaps insoluble in water. In the potash and soda soaps, the greater portion of the glycerine remains in solution, as glycerine is very soluble in water; also, in making a lime or lead soap, the insoluble soap separates, and leaves the glycerine alone in solution in the water; for this reason, oxide of lead was used to separate the glycerine from the fat. It was boiled with oxide of lead and water, till all the floating fat was combined and settled at the bottom, the water was then decanted, filtered, and evaporated; it left the glycerine behind, which, however, was always more or less contaminated with traces of lead.

It was proved by Perkins, in England, in 1822, that in a steam engine, which worked under very great heat and pressure, and in which the condensed steam continually returned to the boiler, the fats and oils, used for lubricating, became, by the combined action of water, heat, and pressure, decomposed into other substances, which, after analysis, were by Faraday pronounced to be identical with the fatty acids and glycerine. Although this was published at the time, the hint was not acted upon till thirty years afterward, when the use of superheated steam was introduced in Germany to decompose fats into glycerine and the fatty acids, and ten years later the original discovery was acted upon in this country, and fat was exposed to water, heat and pressure in a steam-boiler, by which, under a temperature of 370° Fahr., and a consequent pressure of twelve atmospheres, the fat was perfectly decomposed in a period of about eight hours, an essential condition being to keep the water and fat in constant circulation, so as to maintain them in the form of an emulsion, which secures an extensive contact surface of the fat and water particles. The mixture of fat and water being removed, it was found that the water has abstracted from the fat all its glycerine; the fat still floating on the top has changed its neutral nature, and has become an acid. The water being evaporated leaves an impure glycerine behind, which may be subsequently purified by filtration through animal charcoal, or by careful distilation.

It is clear that this last process of decomposing fat is only applicable on a large scale. For small quantities the old method of making an insoluble lead-soap, or its equivalent, is still the most simple.—*Manufacturer and Builder.*

Pepper.

Pepper posses this peculiarity, that, while its production is limited to a small extent of the globe, it is in universal demand both among civilized and barbarous nations. The taste for this spice is no affair of caprice or fashion, and consequently its consumption must increase in the ratio of the facility and cheapness with which the cultivator and the merchant can supply it. The quantity already produced per annum is 75,000,000 pounds—namely, from Java, Sumatra, Borneo, the Malayan Peninsula, the Moluccas, and various regions lying on the east side of the Gulf of Siam. There is, generally speaking, abundant room for improvement in the culture; what is especially required, however—and we speak particulary with reference to India—is a larger application of European capital. When the price is high, a large extent of suitable land is at once put under culture; but no sooner does the price decline, than no care is taken to replace the exhausted plants, or to enrich the impoverished soil, and the cultivation is not only neglected, but pepper districts wholly disappear. The quantity of pepper we have given as the aggregate yield may appear enormous; but the amount named, if distributed among the inhabitants of the globe, would scarcely afford to each a grain a day. Unskilled cultivation is not the only fault connected with the production of this spice. The avidity of cultivators and dealers to bring pepper to a market frequently tempts them to pluck it before it is ripe, and from this cause it turns out light, hollow and ill-flavoured. For years after the discovery of the Eastern Archipelago, pepper was the principle article of export to Europe. It is narrated that Vasco de Gama loaded two vessels with this article at the Spice Islands in twenty-four days. The first stimulus to the Eastern trade, now being, so persistently pushed by the Americans was by the success attending the fitting out of vessels form Boston to what is known as the Pepper Coast. The trade is wholly in the hands of Europeans and Americans, and, provided always labour could be relied on, we know of no branch of investment that offers more satisfactory returns.—*Grocer.*

Elixir of Cinchona with Iron.

A desideratum generally felt by the dispensing pharmacist is a uniform and practical formula for preparing these numerous so-called *Elixirs of Cinchona*—"Ferrophosphated Elixir of Calisaya Bark," "Elixir of Bark and Iron," "Elixir Calisayæ Ferratum," etc., etc.—the manufactures of these *scientific specialties* claiming unusual skill in presenting this *invaluable* combination of *tonics* to the medical profession and suffering humanity.

The following suggests itself as a practical formula, being without a complex process, easy of execution, yielding a permanent and agreeable preparation, and always uniform in strength and composition:

Take of Pyrophosphate of iron, 1024 grains.
Sulphate of cinchona, 128 grains.
Sulphate of quinia, 64 grains.
Oil of orange (fresh), one fluid drachm.
Oil of lemon, half fluid drachm.
Oil of caraway seed, ten minims.
Oil of nutmeg, ten minims.
Oil of cloves, five minims.
Oil of cinnamon, five minims.
Alcohol, twenty-four fluid ounces.
Simple syrup, four pints.
Water, two and a half pints.

Dissolve the sulphate of cinchona and the sulphate of quinia in the alcohol; add the oils and mix with simple syrup.

Dissolve the pyrophosphate of iron in the the water, and mix the solutions; filter and add sufficient water through the filter to make the elixir measure eight pints.

Caramel may be added to color if deemed advisable. Each table-spoonful contains 4 grains of pyrophosphate of iron, ½ grain of sulphate of cinchona and ¼ grain sulphate of quinia.

To this elixir of cinchona with iron, ammonio-citrate of bismuth, one grain to each half fluid ounce, when added, forms the *elixir cinchona, iron and bismuth*, and if strychnia, in the proportion of 1-50 grain to each half fluid ounce is added, it will produce the scientific and "valuable adjunct to the other constituents" under the title *elixir cinchona, iron and strychnia.* O tempora! O mores!—*Pharmacist.*