certainly worthy of the attention of persons engaged in the business.

Gum-arabic diffuses four hundred times more slowly than salt, and hence belongs to the class called colloid.

The method of dialysis can be employed for the detection of arsenic, emetic, corrosive sublimate, or any crystalline poison in the stomach, blood, milk, or any organic compounds. The poisons will pass through the membrane into the outer vessel, and their presence can be shown by the usual tests. The same process can be made available in the case of organic poisons, such as strychnine and morphine, and it is further valuable as a method of original research in seeking for alkaloids in any new plants, and it has even been proposed as the best way for the preparation of alkaloids on a large scale. Many plants contains niter and other mineral salts, which can be separated and detected by dialysis better than in any other way.

Nitrate of sliver, from photographers' waste, when put into the dialyser, passes through to an outer vessel, where it can be precipitated and saved; the albumen and other organic matter will remain in the inner vessel. For this purpose a half barrel, with parchment tied over the bottom, and immersed in a barrel of water, would be a good contrivance.

Great expectations were raised in reference to the separation of sugar from molasses, and its purification by dialysis. Several patents have been taken out for this purpose. At the Paris Exhibition of 1867, Messrs. Carmichel & Co., sugar refiners and distillers, exhibited dialysers for refining sugar, which they called *osmogenes*. Each apparatus contained fifty or sixty frames, forming partitions one quarter of an inch in thickness, and furnished with nettings of strings to support the sheets of parchment paper destined to accomplish the work. The frames with water alternate with those for molasses or sirups. Each frame is provided with an interior opening for the hot water, and another for the syrup, so arranged that each section receives, the one the water, the other the syrup. Both liquids start from a height of three feet, and, after descending to the bottom of the apparatus, return again, at a temperature of 160° to 170° Fahrenheit, and pass out at the top. The water is introduced and regulated according to the extent of purification required.

The inventors of this apparatus claimed for it very important results, and as it was founded upon thorough scientific principles, we see no reason to doubt the truth of their statements. The process is particularly valuable in the manufacture of beet sugar, and for removing potash and lime salts from syrups, but it does not appear to have been generally adopted, probably because it was not well understood.

Mr. Whitelaw took out a patent in England, in 1854, for the removal of salt and niter from salt and corned meats by means of dialysis. It is well known that the brine contains a large proportion of the nutritious constituents of the meat, and if we could remove the salt and evaporate the residue we should have all of the properties of a good soup. It so happens that the savory and valuable constituents of meat are colloids, and will not, therefore, pass through a membrane. The salt, which is added to keep the meat from decay, is crystalline, and, as we have before seen, passes very readily through parchment. Mr. Whitelaw takes advantage of these two facts, and puts the brine into porous jars or bladders, which he suspends in water, that must be renewed three or four times in twenty-four hours. After a few days, the contents of the jars will be found to be fresh and sweet, ready for use as soup, or they can be evaporated down to dryness and converted into meat biscuit. In this country, where such large quantities of corned and salted meats are consumed, the saving of the brine is a matter of much practical importance, particularly as what is thrown away is too often the most nourishing portion of the food.

FILTERING OXYGEN FROM THE AIR.

The same principle of dialysis was successfully applied by Prof. Graham to the concentration of the oxygen in the air. By passing air through the shavings of india-rubber, the rubber retains a portion of the nitrogen, and the quantity of oxygen is increased to forty-one per cent., being twenty per cent more than its usual capacity. An atmosphere with forty-one per cent of oxygen will re-ignite a glowing taper, and, in general, support combustion and respiration in a very active manner. The experiment points out such a simple and cheap way of procuring oxygen from the atmosphere, that it ought to be put to a thorough trial before more money is expended in complicated and costly methods. If, by filtering the air through a membrane, or shavings, or any cheap substances, we can get rid of the nitrogen, we have made a discovery of the highest importance, and the experiments of Graham certainly seem to point out the feasibility of the plan.

Certain physiological phenomena can be very well explained by the doctrine of dialpsis; for example, according to Professor Daubeney, of Oxford, gums, starch, oil, or any similar class of bodies secreted in the cells of plants, must be classed among the colloids; they have no tendency to pass through the walls of the cells where they have been elaborated, and consequently arrange themselves into groups. On other hand, the acids and alkalies are crystalloids, and pass freely through the pores of the cells, and are frequently found on the outside, or they pass to the organs of the plant, where they undergo transformation by action of the vital force. The mucous membrane of the stomach may be compared to the parchment of the dialyser —the crystalloid elements are absorbed, while the colloid remain to be subjected to the action of the gastric juice, which, elaborates according to the laws of nutrition.

The action of different kinds of medicines can be explained according to the same law. Those which are crystalloids will diffuse rapidly through the coating of the stomach, while the amorphous medicines will remain, subject to the action of the gastric juice and the laws of digestion.

The application of dialysis in the dry way has been proposed by a French savant. He assumed that substances which fused at different temperatures could be separated by passing them through a porous vessel on the same principle. Such an application would be most valuable in metallurgy, but thus far it has not been reduced to practice. In the manufacture of paper from sea-weed, after the weeds have been boiled in caustic soda, the black liquor is thrown away. It would be well to put the waste liquor into porous cells, suspended in tanks of fresh water, to see if the crystallizable salts of iodine would not pass into the outer vessel, where they could be reclaimed.

We have thus hastily noticed some of the leading applications of dialysis. It is a process so very easy, so simple, and so cheap, that it only needs to be better understood to acquire great popularity.—*Journal of Applied Chemistry.*

On White Gutta Percha.

BY HARRY NAPIER DRAPER, F.C.S.

A paper on "Pure White Gutta-Percha" was contributed to the Norwich Meeting of the Pharmaceutical Confe ce, by Mr. J. Baden Benger. There were some things so remarkable about this paper, that as I was at the time experimenting on gutta-percha, it attracted my attention. I have not, however, until now, had sufficient leisure to make the points which struck me, the subject of a connected note.

Mr. Benger, after justly observing that much of the substance formed in commerce, under the name of "white gutta-percha," is adulterated with oxide of zinc, proposes a process for the manufacture of a really pure product. This consists in dissolving the crude gutta-percha in chloroform, precipitating the filtered solution with spirit of wine, and pressing, drying, and boiling the precipitate in water.

Mr. Benger appears to have been successful; but when it is noted that, according to the data he gives, the production of three ounces of pure gutta-percha requires from five to six pounds of methylated chloroform, and about three pints of spirit of wine, the process does not appear to be very economical, nor is a practical man much reassured on this point by learning that the chloroform and spirit can be recovered; the former by the addition of water and the latter by distilation "at the leisure of the operator."

This process has not even the merit of originality, as it was patented by Dr. Cattell in 1859.

Dr. Cattell at the same time patented other methods of effecting this object. These depended upon the circumstance that when alcohol or pyroxilic spirit is added in small proportion (the specification says one ounce to each gallon), to a solution of gutta-percha in chloroform or sulphide of carbon, the subsidence of the coloring matter is facilitated. But both Dr. Cattell and Mr. Benger seem to have overlooked the fact that the coloring matter of gutta-percha is quite insoluble in benzol, chloroform, and sulphide of carbon, and that the alcohol of the specification acts (if at all), only by diminishing the specific gravity of the solvent, in the cases of the two last named fluids. We set out then with the proposition that all solutions of raw gutta-percha are properly speaking solutions of the pure resin only, and that the coloring matter is simply held in suspension in them. If chloroform be employed, it is possible to effect the separation either by adding benzöl so as to reduce the specific gravity, or by entangling the precipitate in some heavy insoluble powder. Carbonate of lead has thus been proposed for this purpose. But discarding chloroform altogether, on account of its high price and specific gravity, there remains to us the choice between benzöl and sulphide of carbon. This choice is easily made. Sulphide is by far the better solvent of the two; it is