of the tower in a forked tube, and flow out together, traversing the bricks the concentrated acid falls into reservoir, J (Figs. 1 and 2).

NEW APPARATUS FOR MANUFACTURING GELATINE AT A TEMPERATURE WHICH IS BELOW THE BOILING POINT OF WATER.

Invented by ABRAHAM ZWILLINGER, Vienna.

THIS apparatus gives much better results than those previously used. Its advantages consist in the facts, that the greatest part of the gelatine, mostly 20 to 27 per cent., may be directly obtained from the steaming reservoirs, that the gelatine does not come in direct contact with the steam and with overheated surfaces, that it therefore does not become altered, and that, besides, the glue products may be obtained with certainty and equality at all seasons of the year. The construction of the apparatus may be seen from our illustration.

A¹ and A² are the two steaming reservoirs, each of which, if filled to three-fourths of its height, is able to hold 39,600 lb. of bones. These bones are washed once more with cold water, which afterward flows off through the taps, n₁ and n₂; then steam is admitted into A¹, in order to force out any

water that may still remain, and the pressure is brought upon 2-3, and kept for about an hour and a half at this height. At the end of this time the steam is led through L into A², here the same pressure is established and prolonged for the same length of time. This operation is repeated from three to six times; the gelatine is drawn off from every quarter to every half hour, and the decrease of pressure which is thereby caused is equalized by admitting new steam. Afterward, the bones in the steam reservoirs are alternately macerated by means of hot water, which enters from the reservoir, R, which has meanwhile been heated, and by means of air compressed to three, coming from the compressor, B; finally, they are again treated with steam till the extraction is completed. The gelatine is collected in the Montejus, M, and brought afterward into fermentation-vats where it is condensed in the vacuum to 45°.

APPARATUS FOR COATING LABORATORY TOOLS.

METALLIC tools and other articles, particularly those consisting of iron or steel, which are used in laboratories or other workshops where acid vapors are of frequent occurrence, may be protected from rust with a black shining coat which resists acids and is but little affected even by a low red heat, in the following manner. Have a sheet-iron box (see figure) constructed, large enough to hold all the tools, etc., to be coated, and provided with a false bottom of wire netting. Underneath this is placed a layer of crushed coal (blacksmith's coal), about one centimeter deep; then place the tools, which must be entirely free from rust, clean and polished, upon the wire net. The box is then covered and set on a strong fire, which causes the coal to give off tarry constituents, and the heat continued until the bottom of the

APPARATUS FOR COATING LABORATORY TOOLS.

box is at a red heat. When all evolution of gas has ceased, the box is allowed to become cold and the tools are taken out, and will be found covered with a beautiful glossy coat. Tongs, shear, pincers, etc., so coated, keep in good condition for many months, even in places where the air is constantly mixed with acid vapors.—*Technik der experimental. Chemie.*

AN EXPERIMENT WITH SULPHUR.

By T. GROSS.

THE author doubts the elementary character of sulphur. By heating a mixture of sulphur (commercial milk of sulphur*) and linseed oil in an open basin, he obtained a black porous mass, which dissolved in concentrated sulphuric acid, after long-continued heating, to form a sirupy liquid. After dilution, sulphureted hydrogen was passed into this liquid, and produced a light brown precipitate, soluble in ammonium sulphide or in hot potash solution. When burnt in air, this precipitate left a black residue, which was not acted on by inorganic acids, was not attacked by oxygen even at a

* No attempt seems to have been made by the author to ascertain whether the sulphur was pure or not.

red heat, and was but slowly and partially changed by chlorine with formation of a sublimate, which was reduced to the original black substance by the action of hydrogen.—*Chem. Centr.*

PROCESS FOR THE MANUFACTURE OF AMMONIAC FROM LEATHER RUBBISH BY MEANS OF DISTILLATION WITH CARBONATE OF LIME.

It has long been known to chemists that sulphate of ammonia can be produced from old leather rubbish, but this process has not hitherto been used in factories, because it was believed to be too expensive. Mr. Hermann Proschwitzky, of Stettin (Patent of the German Empire, 10,957, of February 10, 1880), has now received a patent for a proceeding by which this chemical substance may be manufactured by distilling old leather scrap together with quick

Fig. 1.

lime. The quality of the product thus obtained is quite as good as that obtained from the refuse wash water of gas factories or from bones, and this process is much cheaper than the usual ones, because the value of the remainder and of the accidental products covers the expenses of the materials used and of the production.

The retorts are filled with alternate layers of leather scraps and lime (each of the latter having four times the weight of each of the former) and are then closed by a cover which is made air-tight by fastening it down with screws and cement. Into the vessels, c, d, e (Fig. 1. and Fig. II.), is poured as much sulphuric acid of 30° B., as is necessary to absorb the ammoniac developed from the leather. These vessels are of wood and lined with lead. The vessels, a and b, are

Fig. II.

made of cast iron and placed into cooling reservoirs, and in the former carbonate of ammonia, gall-water, and tar are deposited.

In order to know exactly whether the distillation is finished or not, the vessels, d and e, are connected by means of a Weber's bulb-tube, the liquid contained in which, indicates the increase and decrease of pressure in the retorts. If the pressure should be too great, the tap of the collecting tube must be opened in order to prevent the liquids from rising into the retorts.

When the vessels have been filled and closed, the retorts are heated to a red heat and kept in that condition till the pressure ceases, which will be the case in about four hours. After this the contents of a and b are put into a barrel, which is furnished with a tap at the bottom. When the tar and gall-water have been separated, the former, which contains

the carbonate of ammonia in solution, may be drawn off as a clear liquid. This liquid, and the contents of the vessels, c, d, e, are poured into a flat leaden pan, f (Fig. III.), a part of the water is evaporated by means of an evaporation spiral, and the remainder is brought into shallow leaden vessels, g, where, after cooling, the salt is deposited.

The remaining liquid which still contains an excess of sulphuric acid may be used again.

Fig. III.

Another method for separating the salt from the liquid, is to saturate the product contained in the vessels, a and b, after it has been clarified in the manner mentioned above, with sulphuric acid, to use the sulphuric acid contained in the vessels, c, d, e, until it has become perfectly neutralized, and to continue with the evaporation of both products until all the salt has been extracted.

After the fire has been removed from under the retorts, and when these have become somewhat cooled, the contents are taken out and brought into an air-tight vessel made of bricks, where they become perfectly cold. These remaining products are finally separated from each other and may be used to advantage. During the manufacture a great quantity of gas is developed which may be profitably employed for the heating of the retorts.

REDUCTION OF GOLD AND SILVER FROM ORES CONTAINING SULPHUR, ANTIMONY, OR ARSENIC.

(Patent of the G. A., 10,716.)

THE ores, which are reduced to very small pieces, are heated in a retort to dark-red heat, and a current of hydrogen is led through them. By this process sulphureted hydrogen is formed, while the arsenic is sublimated. The remaining ore, which still contains undecomposed sulphurous copper, is ground and roasted upon a hearth, whereby the sulphurous is transformed into sulphate of copper and oxide of copper, and, besides, oxide of antimony and tetroxide of antimony (antimonoxide antimoniate) is formed. The oxide of copper is now dissolved in cold sulphuric acid of twelve per cent. The copper is precipitated in this solution by means of iron. The remainder is treated with concentrated muriatic acid in a vessel which is tightly soldered with lead; by this treatment the combinations of antimony are transformed into chloride of antimony, and this liquid is finally decanted. The remainder now contains all the gold and silver, which was originally contained in the ore. If only the extraction of silver is required, this metal may be obtained by dissolving the chloride of silver in natriumthiosulphate. If both gold and silver are to be extracted, it is done by a process of amalgamation. In order to extract gold and silver by a dry process, the dechlorated remainder is mixed with one half of its weight of litharge and one fiftieth of its weight of pulverized charcoal. The mixture is molten together with lead and stirred up with green wood. The noble metals are reduced by zinc or any other adequate method.

THE THERAPEUTICAL USE OF THE MAGNET.*

By WILLIAM A. HAMMOND, M.D., Surgeon-General U. S. Army (retired), Professor of Diseases of the Mind and Nervous System in the Medical Department of the University of the City of New York, etc.

THAT a magnet is capable of exercising a strong physiological influence over animals and even plants is a fact which, though overlooked or disregarded by physicians generally, experiment has definitely established. The reason for this neglect is doubtless to be found in the circumstance that the promulgators of the science of magnetism in its relations to life have generally mingled so much chaff with the grain of wheat that the latter has been lost sight of in the great superfluity of the former.

Several years ago the subject was investigated by the Baron von Reichenbach, a man who not only was endowed with profound learning, but was held in great respect by Liebig and other eminent scientists. He performed a large number of experiments upon neurotic men and women, and, though much that he deduced from his researches must be regarded as not proven, this can not be correctly alleged of all his conclusions. For instance, that the following observation is true, any one can easily determine for himself. I have repeatedly satisfied myself of its correctness.

"If a strong magnet, capable of supporting about ten pounds, be drawn downward over the bodies of fifteen or twenty persons, without actually touching them, some among them will always be found to be excited by it in a peculiar manner. The number of persons who are sensitive in this way is greater than is generally imagined. . . . The kind of impression produced on these excitable people, who otherwise may be regarded as in perfect health, is scarcely describable; it is rather disagreeable than pleasant, and combined with a slight sensation of cold or warmth, resembling a cool or gently warm breath of air, which the patients imagine to blow softly upon them. Sometimes they feel sensations of drawing, pricking, or creeping; some complain of sudden attacks of headache; not only women but men, in the very prime of life, are found distinctly susceptible to this influence; in children, it is sometimes very active."

It is undoubtedly a fact that experiments such as these are liable to lead to very deceptive results. All persons are more or less under the operation of the "principle of suggestion;" that is, of seeing and feeling as they are expected or told to see and feel. But, even when performed with every precaution taken to guard against the operation of this factor, phenomena not differing essentially from those observed by Reichenbach are produced. As an example of this, I adduce the following experiment, performed only a few days ago:

A gentleman, thirty years of age, and by no means of an impressionable nature, by request bared his right arm up to the shoulder, and laid it at full length on a table. I then bound a handkerchief tightly over his eyes, and desired him to tell me what sensations he felt in the arm. Having thus induced him to concentrate his attention on that part of his body, I held a strong horseshoe magnet immediately over the nape of his neck and at about the distance of an inch from the skin. In thirty-two seconds, by the watch, he said: "I feel nothing at all in my arm, but I feel a queer, numb sensation at the back of my neck." In about ten seconds more he exclaimed: "It feels now as if you were focusing a sun-glass on the back of my neck." I removed the magnet, and asked him if he felt nothing in his arm. "No," he replied, "I think not."

While he was talking, I hastily brought the magnet over the top of his head, at the same time stroking his arm with a paper knife. "I feel you rubbing my arm with something," he said, "but the numbness has gone out my neck, and is just on the crown of my head."

I then took the magnet away, and then moved it over the arm, from the shoulder to the fingers, at the distance of an inch or so from the surface. After two or three passes of the kind, he said: "Now I do feel something in my arm; it is a sensation as if you were sticking pins in it, though it does not hurt." After a few seconds: "Now it feels like the sun-glass all along the arm."

Other modifications of the experiment were made, and always with the like result. It was evident that the magnet produced sensations in parts of the body where its proximity was not suspected.

* Read before the New York Neurological Society, October 5, 1880. From the New York Medical Journal.

† "Physico-Physiological Researches on the Dynamics of Magnetism," etc. English translation by Dr. John Ashburner, London, 1851, p. 3.