The pipes are made about $\frac{1}{4}$ in. thick, and in point of price will compare favourably with earthenware, doing the same amount of work.

Whatever the practical value of such an apparatus may be—and it is perhaps better adapted for the preparation of pure acids, &c., than for the condensation of the crude hydrochloric acid of alkali works—it certainly satisfies one of the requirements insisted on by Dr. Hurter as necessary for successful condensation, namely, that of providing “ample cooling” surface in that part of the apparatus in which the gas comes in contact with the condensing liquid.” Each pipe of the size shown has a capacity of about 3 cub. ft., and a surface area of over 9 sq. ft., or say 3 ft. of surface to one of capacity. In the stone condenser, 40 ft. $\times$ 8 ft. $\times$ 8 ft., employed by Dr. Hurter in some of his experiments, the relation of vertical surface to capacity is only as 0.5 : 1, and the sides of course are enormously thicker in the case of stone than in glass.

A QUALITATIVE TEST FOR GLYCEROL.

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In the following qualitative test for glycerol advantage is taken of two characteristic reactions:—

(1.) The formation of acrolein by the distillation of glycerol with acid potassium sulphate, according to the equation:—

(2.) The red colouration produced with a solution of rosaniline, decolourised by sulphur dioxide, by acrolein, as by all aldehydes (Schiff and Caro's reaction).

To carry out the test the solution containing the glycerol is evaporated down to about 5–10 cc. in a small porcelain dish, about 1 gm. of powdered acid potassium sulphate added, the whole well mixed together and then taken to dryness on the water-bath. The residue is transferred to a hard glass tube, 3–4 in. long, fitted with a cork and exit tube, the latter passing into a test tube containing water. On heating the tube the acrolein is readily evolved and is dissolved by the water in the test-tube; the contents of the latter can then be tested for the presence of an aldehyde in the usual way by the addition of a few drops of Schiff's reagent. Both before and after the addition of the reagent the solution in the test-tube should be well shaken; the colour only develops slowly and reaches its maximum after 15–20 minutes standing. If the aqueous solution happens to have got warm by the condensation of steam evolved during the distillation, it must be cooled before adding the reagent, since the latter turns red on warming in the absence of an aldehyde.

The delicacy of the reaction has been tested by Mr. J. T. Conroy, B.Sc., and Mr. B. W. Jones, with the result that it is possible to detect 0.015 gm. of glycerol in this way; or in round numbers, 1 part of glycerol in 650 parts of water, by evaporating down 10 cc. of the solution, and therefore 1 part of glycerol in 6,500 parts of water by evaporation down 100 cc.

The reaction is not given by any of the following substances: Mannite, cane sugar, grape sugar, milk sugar, starch, dextrin, albumen, gelatin, stearic acid and oleic acid; but the carbohydrates interfere with the delicacy of the test owing to the fact that their distillation products with acid potassium sulphate hinder the formation of the red colour with the rosaniline solution. To carry out the test in presence of sugar, the latter must first be removed by evaporating the solution in the presence of calcium

hydrate and sand or of calcium hydrate and calcium carbonate, and extracting the residue with a mixture of 2 parts of alcohol to 1 part of ether. On evaporating this extract with acid potassium sulphate and distilling the residue, the reaction is obtained as above, but it is not possible to detect less than 0.03 gm. of glycerol in the presence of much sugar, or 1 part of glycerol in 3,300 parts of water by evaporating down 100 cc. of the solution.

The reaction must be similarly applied in testing for glycerol in wine and in beer; the limit of its delicacy in these cases is the same as above. In testing milk for glycerol the casein, albumen, and sugar should be first removed.

Fatty acids do not interfere with the delicacy of the reaction.

Compared with other colour reactions for glycerol, this test appears more characteristic, though not quite so delicate as Reichel's phenol test (this Journal, 1882, 202). It is considerably more delicate than Reichel's pyrogallol test (this Journal, 1883, 356), and also more delicate than the borax test (Senier and Lowe, J. Chem. Soc. 1878, 404).

Mr. E. CAREY asked whether it would not be possible to apply the test for the quantitative determination of glycerol colorimetrically?

Dr. KOHN replied that this might be done as long as only small quantities of glycerol were concerned, but he did not consider that the depth of colour obtained would serve as a quantitative reaction when the tint first got was a fairly deep one, even if dilution were resorted to for comparison.

ADJOURNED DISCUSSION ON DR. HURTER'S PAPER ON THE CONDENSATION OF HYDROCHLORIC ACID GAS.

(See Journal, VIII., 861–67.)

Mr. A. E. FLETCHER said he had read the paper by Dr. Hurter with great interest. His own experience had led him to advocate largely what Dr. Hurter had pointed out, viz., that condensers should be kept cool. It was of great importance to abstract the heat which was generated by the act of condensation. A question might arise as to the wisdom of using capacious coke towers as condensers, as being likely to retain the heat of condensation, but probably the reason why such large vessels were used was that the supply of hydrochloric acid was intermittent. A large massive coke condenser acted both as a condenser and a water receiver. The supply of hydrochloric acid was intermittent, and at the time the gas approached the condenser the latter was nearly full of almost clean water. The gas attacked it at the bottom and gradually gained on the water supply, which was constant and slow. It might reach near the top of the tower, but before it did so the supply of acid diminished, because the charge in the decomposing pot was getting spent; then the water gained on the hydrochloric acid, thus preparing the tower to receive the next charge of acid gas. He thought that was the *raison d'être* of large condensers, otherwise it would be much better to have smaller vessels, such as pipes and tanks.

There was an interesting passage in the paper calling attention to the fact that air, passed through hydrochloric acid of 12° Tw. would come away with about 0.2 gm. HCl per cubic foot. This did not, however, affect the question of condensing, because the top of the condenser, being filled with clean water, the hydrochloric acid came in at the bottom and passed away from the top. The solution of HCl thus became weaker as it rose up in the tower.

A point of practical importance in the condensation of hydrochloric acid not mentioned in the paper was the difficulty of wetting particles of matter when disseminated through a gas, producing a sort of acid fog. The hydrochloric acid must be supposed to be condensed already, but the