w_1 = proportion of rape-seed oil
w_2 = proportion of cotton-seed oil
w_3 = weight of mixture (20 per cent.)
t_1 = temperature of melting point fatty acids of rape-seed oil.
t_2 = temperature of melting point fatty acids of cotton-seed oil.
t_3 = temperature of melting point of mixed fatty acids.

Then $w_1 = w_3 \frac{t_3 - t_2}{t_1 - t_2}$

$w_2 = w_3 \frac{t_3 - t_1}{t_2 - t_1}$

Inserting the values:

$w_1 = 20 \frac{23 - 30}{20 - 30} = 14$ per cent.

$w_2 = 20 \frac{23 - 20}{30 - 20} = 6$ per cent.

Or,

Paraffin oil	80 per cent.
Rape-seed oil.....	14 per cent.
Cotton-seed oil.....	6 per cent.
Total	100 per cent.

By synthetical work upon these proportions, with comparison of viscosities of the sample submitted with the product, the result will be not only a correct analysis, but a working formula can be given by which a manufacturer can duplicate the original oil.

STEVENS INSTITUTE OF TECHNOLOGY,
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AN AUTOMATIC EXTRACTOR.

BY W. D. HORNE.

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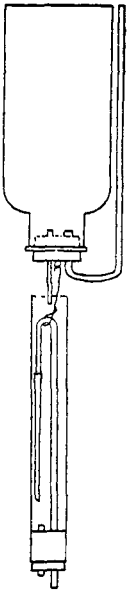
IN the analysis of commercial fertilizers soluble phosphoric acid is separated by repeated washings of the mass with small quantities of water. Two grams of the sample are treated on a ribbed filter with successive portions of water, about ten cc. at a time, until at least 250 cc. have run through, each addition being deferred until the preceding has passed through.

Feeling that time might be saved by having this washing done automatically led to the device of a simple apparatus which mechanically delivers the required quantity of water at measured intervals in a gentle stream upon the material on the filter, stirring it up and leaching out the soluble matter without requiring any attention after the start.

One part of the apparatus consists of a wide-mouthed bottle of 250 cc. capacity closed by a cork perforated by two glass tubes. One tube projects outward about three or four cm. and tapers to a moderately fine point. The other tube, after emerging from the cork, curves directly over the edge of the cork and extends down the full length of the bottle on the outside. The bottle, being filled with water, is inverted, and the water drops from the end of the short tube, while the necessary air enters by the long bent tube and bubbles up through the column of water in the bottle. As the rate of flow or dropping depends principally upon the fineness of the point of the dropping tube and the freedom of the air's access through the longer tube, any desired rapidity of flow can be obtained by varying the size of either tube. It is more advantageous to use the same dropper and to regulate the air supply by plugging more or less loosely the upper end of the air tube with an appropriate stopper.



So much for the water supply. In order to convert this into an intermittent washing stream it flows into a tube suspended below, provided with a capillary siphon tube within, whose longer limb passes through a stopper at the bottom of the outer tube, something like the Adams fat extractor.

To make this part of the apparatus, cut the bottom off of a test tube fifteen mm. in diameter and fifteen cm. long, close one end with a rubber stopper with one hole, and within the test tube put a three mm. tube bent double by a sharp curve, with one limb about fifteen cm. long and the other about three cm. The longer limb passes through the hole in the stopper at the bottom of the test tube, while on the shorter limb is put a piece of rubber tubing of variable length, according to the quantity of water that is to be siphoned off at each delivery. To the loop of the siphon fasten one end of a short wire, whose other end terminates in a hook to catch in a wire eye inserted in the cork of the inverted bottle.

Thus suspend the siphon apparatus to the water supply, having the dropping tube inside the test tube. When the water is allowed to drop the test tube slowly fills, until the water, rising in the siphon's short arm, passes beyond the bend and siphons over. The operation then repeats itself.

The speed of dropping from the reservoir must be such as to allow each siphoned portion to pass completely through the filter before the next flows on. And the quantity which siphons over each time is to be regulated by varying the length of the rubber tube which extends from the short limb of the siphon. The lower end of this rubber tube is cut off diagonally to ensure complete emptying of the siphon at each delivery.

These things once arranged, they need little attention afterwards.

Only a moment is required to fill the bottle, attach the siphon tube, and hang the inverted bottle in its rack with the filter containing the fertilizer below it in a funnel resting in a flask.

The washing is done regularly, without attention and without loss of time. A few supplementary washings by hand may be well to get the material all into the point of the filter, although experiments have shown that the mechanical washing is thorough and gives results identical with the tedious hand method.

THE ACTION OF GASEOUS HYDROCHLORIC ACID AND OXYGEN ON THE PLATINUM METALS.[1]

By Wm. L. Dudley.

HENRY (*Trans. Roy. Soc.*, *1800*, 188) discovered that hydrochloric acid gas, mixed with one-fourth its volume of oxygen, passed over platinum black, was decomposed and water formed: $4HCl + O_2 = 2H_2O + 2Cl_2$.

While working up some platinum and iridium residues, I found that finely divided platinum sponge on being washed with hydrochloric acid gave ample evidence of solution. This led me to investigate the subject further.

[1] Read before the American Association for the Advancement of Science, Madison Meeting, August, 1893.