and low protein wheats and in the isolation work from corn.

The procedure is briefly as follows: Dry whole wheat kernels are soaked for four hours in sodium hydroxide solution at pH 10.5, ground in a glass mortar with clean sand, allowed to stand at 20° C. for 45 hours (together with one ml of toluene) with the pH maintained at 10.5. At the end of this period, the mixture is centrifuged, and the supernatant liquid is tested by the standard Avena procedure.

Table I illustrates a typical experiment. The value obtained at pH 10.5 compares favorably with the amount of auxin recovered by the biological digestion method.

TABLE I

pH	Auxin per kilogram of wheat*
4.0	0.37 mgm.
7.0	2.25
10.5	6.96
11.5	1.50

* In terms of indole-3-acetic acid.

Temperature effects were also considered. Above 60° C. losses began to occur. The maximum rate of hydrolysis was found to lie between 35° and 40° C. However, since the rate was almost the same at 20° C., the investigation was carried out at room temperature in view of practical considerations involved.

Tests upon samples of corn showed the same effects of increased auxin activity upon standing at pH 10.5 as did the wheat. Yellow cornmeal, fresh from the mill, was found to be more convenient for isolation purposes and accordingly was used.

It was found that a 50 per cent. acetone-water mixture could be satisfactorily used for the hydrolysis. The ratio of solvent to cornmeal was adjusted to form a thick paste-like mass, and the pH was maintained near 10.5 for a period of 45 to 60 hours. After the hydrolysis period, the mass was pressed, and the residue was washed with a 50 per cent. acetone-water mixture. The filtrate, combined with the washings, formed the initial extract for the isolation. Addition of sodium chloride gave rise to the formation of a separate acetone layer; after separation, the aqueous residue was washed with acetone. The acetone solutions were distilled, and the distillation residues were combined and extracted with ether. The isolation proceeded from the ether-soluble material according to the general procedures already described in the literature for isolation from other materials.[4, 5]

The isolations gave as an end product a syrup which was physiologically active and which gave a color reaction with ferric chloride similar to that given by indole-3-acetic acid. Upon long standing this syrup crystallized. A portion of the material, when recrystallized, showed a melting point of 164–5° C. and no melting point depression on mixing with synthetic indole-3-acetic acid. This is proof of the identity of the isolated material with indole-3-acetic acid, and is the first time that indole-3-acetic acid has been isolated from higher plants. Since the amount of the isolated acid is many times greater than the auxin amount indicated by the normal extraction process, it undoubtedly represents a large part of the auxin present in bound form.

In addition to the indole-3-acetic acid, there was obtained a small amount of crystalline pseudo-auxin-a which melted at 196–7° C., with sintering beginning at 173°. Kögl, Koningsberger and Erxleben[6] give the melting point of pseudo-auxin-a as 193–4° C., with sintering beginning at 176°. This shows the presence of some auxin-a in the original starting material, which rearranged to pseudo-auxin-a during the isolation procedures.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN IMPROVED GAS BURNER FOR SMOKING KYMOGRAPH PAPER

WHILE experimenting with a protective "skirt" in order to decrease the susceptibility of the paper-smoking flame to air drafts, it was found that such a protective skirt can be made to yield very great improvements in other characteristics of the flame as well. Not only are draft sensitivity and flickering greatly diminished, but the flame also becomes far more efficient in smoke formation, becoming relatively cool, dull red and very smoky. The relative coolness has been found particularly valuable in the student laboratory, since we have found it practically impossible to scorch the paper with the new burner while using benzol enriched gas.

The essential improvement of the burner consists in surrounding the usual perforated delivery tube with a "skirt" in the form of an inverted V, open at the top and bottom, which serves the purpose of limiting the air supply to the flame. The amount of air drawn

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[5] F. Kögl, A. J. Haagen-Smit and H. Erxleben, *Zeits. physiol. Chem.*, 214: 241–261, 1933.

[6] F. Kögl, C. Koningsberger and H. Erxleben, *Zeits. physiol. Chem.*, 244: 266–278, 1936.

in at the large lower orifice is determined by the ratio of upper exit area to gas volume, since the upper exit is responsible for back pressure from the gas passing through it. This critical ratio may be varied by adjustment of either gas flow or exit width, or both.

Several constructional details are important. The "skirt" is made of hard asbestos plates (sheet metal warps badly) attached to end-plates by single bolts, so as to permit adjustment by rotation of the sides. The end-plates are mounted upon the ends of the burner tube, the whole forming a chamber surrounding the flame and parallel to it. The upper orifice is situated about one and a half inches above the burner tube, and the lower orifice about an inch below this tube (not critical). All screw-heads on the inner surface must be countersunk, as the flame mirrors faithfully any such irregularities.

Because of the great improvement in uniformity of the flame it has been found advantageous to insure constancy of the paper surface during smoking. This has been accomplished by mounting adjustable uprights at either end carrying roller discs between which the drum shaft rests and rotates during smoking. The paper surface should not be nearer than about one inch from the upper orifice, as the amount of gray ash deposited increases with nearness to the flame exit.

In practice, the upper orifice must be made a little wider than that which yields the coolest and smokiest flame. This limitation is imposed by the fact that combustion can be made so incomplete as to deposit an admixture of gray ash along with the carbon.

With this relatively cool flame the carbon deposit possesses remarkably little adhesive power, consequently requiring very little writing-point pressure. However, this improvement carries with it the penalty that the deposit may be partially removed by the slight force of immersion in shellac solution, causing streaking. This may be entirely obviated by the simple expedient of floating the record on the shellac surface for a few seconds before plunging it in as usual, so that the carbon deposit is gently moistened by the liquid soaking through the paper, and is then not removed by subsequent immersion. Parenthetically, this same method has also been found to yield great improvement in the optical qualities of records smoked by the conventional flame. It appears that the initial submersion method removes a loosely adherent surface carbon layer, leaving a thinner and more shiny surface which is optically much poorer. This great difference may be very easily and convincingly demonstrated by "float wetting" only half of a record prior to immersion of the whole. The preliminary flotation wetting requires no appreciable increase in time, and is sufficiently complete as soon as the surface changes perceptibly, which occurs within a few seconds.

The author wishes to acknowledge indebtedness to Mr. William Darby for valuable contributions to the design, and to Mr. Henry Koch for the lay-out and construction of the finished instrument.

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OXIDATION PREVENTION

RAPID spoilage of photographic developing solutions by oxidation is common, annoying and expensive. The usual method for reducing such loss is by repeated transfer of the solutions as they are used up to successively smaller bottles, so that there will be a minimum of air between the liquid and the stopper. Such transfer is a nuisance and requires maintenance of a stock of bottles varying in capacity, each kept scrupulously clean, ready for filling and labeling.

A layer of cheap mineral oil an eighth of an inch deep will float on the top of developer in any bottle, will prohibit this destructive oxidation and will adjust its level to the volume of unused solution. Developer may be removed from below the oil or added under the oil by such a siphoning arrangement as shown. Developer may be induced to rise in the glass tube *A* and overflow into any container by blowing into the glass tube *B*. For such blowing, a cheap atomizer bulb may be "plugged in" to the *B* tubes of any number of such units, one after the other, and used to increase the air pressure over the developer. Unplugging the atomizer unit quickly releases the pressure and stops the flow. The only air–developer contact is in the tube *A* and is of negligible area. It is good technique to dry off the open end of tube *A* after removal or addition of solution since a drop will collect there, but otherwise there is nothing to wash, wipe, move or label.

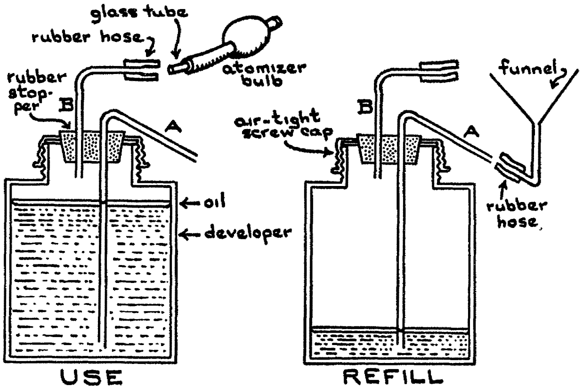

FIG. 1

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