obtain the least degree of dissipation of the substance when heated. For example, the test-tubes used are long and narrow, thus acting as a reflux condenser when the reagent is heated in the oil bath.

If deemed advisable all unused reagent and mixture from the determination may be saved and the pyridine recovered by simple distillation.

Summary

A colorimetric method for the micro-determination of 2,2 bis(p-chlorophenyl) 1,1,1 trichlorethane (DDT) is presented. The test is based on the discovery that when DDT is heated in an anhydrous pyridine solution containing xanthydrol and solid potassium hydroxide a red color develops, which under proper conditions is proportional to the amount of DDT present.

The reaction is sensitive to as little as 10 gammas of DDT. It will detect small differences in concentration within the range of 10 to 200 gammas. The test is relatively simple and can be run in a comparatively short time.

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A SIMPLE VOLUMETER

During the course of some recent work it became necessary to determine the volume of turtle eggs. The volumeter described here was originally constructed for measuring eggs of 4 cc to 5 cc volume, but the principle can be utilized in similar devices of other size ranges. Methods for determination of the volume of very small glands have been described recently,[1,2] but the principles involved in these procedures could not be used in our problem.

The volumeter was made from a wide-mouthed glass-stoppered bottle of 250 cc capacity. The diameter of the mouth, not the volume, is the determining factor in selection of the bottle. A hole 10 mm in diameter was drilled down through the glass stopper. A 10 cc serological pipette graduated in tenths was then cemented into the hole, mouth end down, by means of plaster of Paris. Another hole of the same diameter was drilled through the side of the bottle 15 mm from the bottom and into this hole was inserted a rubber stopper of a size suitable to insure a tight fit. The tip of a 20 cc Luer syringe was inserted firmly into a small hole bored through the rubber stopper.

To operate, the bottle is first filled with water and a few cubic centimeters are drawn back into the syringe. The glass stopper carrying the pipette is inserted in the bottle and held in place to prevent lifting out when all the water in the syringe is returned to the bottle by pushing in the plunger. A few trials will determine the amount of water that must be first placed in the bottle and withdrawn into the syringe in order to obtain an initial reading near the lower graduations of the pipette. After the initial reading has been taken, sufficient water is then drawn back into the syringe to permit the removal of the stopper and allow the object to be measured to be placed in the bottle. With the object immersed in the water, the stopper is replaced, held firmly in position and the syringe plunger again pushed in all the way. The distance the column of water rises in the pipette above the initial reading indicates the amount of water displaced by the object. The final reading is then made.

Readings are easily reproducible to 0.1 cc and readings to 0.05 cc can be made if a pipette with graduations wide enough apart is selected for use.

The construction of the stopper and the insertion of the pipette should be such that the trapping of air-bubbles is avoided. While the use of a 10 cc pipette might seem to limit the usefulness of this particular device to a range within the capacity of the pipette, the measurement of eggs up to 15 cc volume was made. Eggs close to 10 cc volume were frequently encountered and when the initial reading lay near the 1 cc mark on the pipette, the final reading would go beyond the limits of the pipette if the plunger were pushed back into the syringe all the way. In these cases it was found that with a little practice accurate final readings could be made by returning the plunger only to the 5 cc mark on the barrel of the syringe, this 5 cc being added to the final reading obtained on the pipette. By using a syringe with a precision line engraved on the end of the plunger, accuracy is increased. Similarly, still larger eggs can be measured by returning the plunger only to the 10 cc mark. Another method of arriving at the same end would be to withdraw 5 cc or 10 cc of water from the bottle by means of a pipette after making the initial reading before putting back the stopper to make the final reading. This method would necessitate replacing water after each measurement to make initial readings. It is also possible that a number of stoppers of transparent plastic material might be made and fitted to the bottle so that a series of pipettes of different sizes would be available for the same device.

In our work the placing of the eggs in the bottle was facilitated by making use of a small wire net dipper with which to lower the eggs into the bottle and to remove them. With ordinary care, loss of water can be avoided in the operations attendant upon removing the glass stopper and lifting the wire dipper. The dipper is allowed to remain in the bottle

[1] C. A. Swinyard, *Anat. Rec.*, 74: 71, 1939.
[2] H. O. Burdick, *Endocrinology*, 28: 676, 1941.

during all the readings. With this volumeter, measurement can also be made of objects that float.

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PHENOL AS A TERMITE REPELLENT

TESTS previously reported[1] and still in progress, in preventing the attack of the West Indian dry-wood termite, *Cryptotermes brevis* (Walker), on most susceptible woods, indicate the value of heavily chlorinated or brominated compounds of phenol. Hexachlorophenol proves to be not as good as pentachlorophenol, but if substitution is made with copper, the resulting copper pentachlorophenate is much superior in repelling termites. Other metals of somewhat lesser value for this purpose, tested as sulfates, nitrates, chlorides, bromides and acetates, but not in other organic compounds, are zinc, ferric iron, cadmium and antimony. Minute amounts of some mercuric and mercurous salts initially make impregnated wood almost as powerfully repellent as do cuprous and cupric, but in the course of weeks or months, termites are able to eat the treated woods with impunity. Red mercuric iodide dissolved in acetone makes wood so toxic that termites die before they can crawl off the treated sample, but the wood quickly fades to its normal color and is then no longer either toxic or repellent.

Repeated tests with phenol, not in combination, indicate that its effect on the termites disappears even more rapidly. Service and laboratory tests of the phenolic glue used in the manufacture of plywood show that the termites usually begin feeding where the glue holds the sheets of wood together, although structurally this is not a point of weakness. Indeed, by comparison with other coal-tar constituents, phenol would seem one of the least promising upon which to build, except solely on the basis of low initial cost, to produce the ideal termite repellent.

Against the dry-wood termite, initial toxicity is of little importance as compared with permanence in remaining repellent, in which fluorene, phenanthrene, fluoranthene and pyrene are greatly superior (see Table 1).

TABLE 1

DAYS AFTER SUBMERSION TEN MINUTES OF WOOD SAMPLE BEFORE ATTACK BY THE WEST INDIAN DRY-WOOD TERMITE, *Cryptotermes brevis* (WALKER)

Dilution of	0.01%	0.02%	0.05%	0.1%	0.2%	0.5%	1%	2%	5%	10%
Phenol								2	3	4
Orthochlorophenol								4	7	9
p-Bromophenol							7	10	12	–
2,4-Dibromophenol							7	16	18	–
Tribromophenol							3	12	14	–
Thiophenol							8	10	13	–
Pentabromophenol					5	14	uneaten to date			
Pentachlorophenol				10	13	273	337	uneaten to date		
Hexachlorophenol					5	7	uneaten to date			
alpha-beta-Methylnaphthalene							6	9	12	–
3,5-Xylenol							4	54	–	
Fluorene						5	7	73	–	
Phenanthrene					4	7	8	87	–	
Fluoranthene			9	10	24	25	31	360	–	
Pyrene			2	4	19	25	182	195	–	
Copper Pentachlorophenate	27	42	uneaten to date							

The maximum effectiveness for this particular purpose would presumably be obtained by a combination of some of these organic compounds with the repellent metals. Or, if by heavy chlorination the relatively cheap naphthalene can be made to retain more permanently its initial toxic and repellent characteristics, the result of combination with the metals might be preferable even to copper pentachlorophenate. So far as known, none of the suggested compounds is commercially or even experimentally available. But if the entomologist can record and interpret the reactions of the termites, the research synthetic chemist should be able to take advantage of this information and produce such compounds, specifically designed to protect susceptible wood and wood products from termite attack.

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[1] *Caribbean Forester*, 4 (4): 145–57, July, 1943, and 5 (4): 171–80, July, 1944.

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