

PHOSPHATE DIVISION RESEARCH DEPARTMENT

Short Form Report No. 2026

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Research File

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TITLE: BIPHENYL ANALYSES ON BAGS AND OIL MIXTURE FOR WAXSIDE PAPER COMPANY
ST. LOUIS, MISSOURI.

INTRODUCTION:

The Sales Department requested by letter on March 8, 1946, that the amount of biphenyl be determined for Waxside on paper bags which were impregnated with biphenyl. Another letter on March 14, 1946, requested that the amount of biphenyl in a paraffin wax and mineral oil mixture from Waxside be obtained.

SUMMARY:

Weighed squares of paper (5" x 5") were analyzed by extracting the biphenyl with distilled chloroform. Then the intensity of the blue color produced when the extraction solution was reacted with sublimed $AlCl_3$ was matched with known standards. This method of analysis is reported in a recent work by R. G. Tompkins and F. A. Isherwood.

Originally only the inner layer of the multiwall bag had been impregnated and most of the biphenyl was found there, but some biphenyl was found in the middle and outer layers of the bag. The table in the experimental section shows these data.

The oil mixture was fractionated in a 1" x 4' packed column in order to effectively cut out the biphenyl fraction. Material boiling at 252-254°C was collected as the biphenyl fraction, which constituted 17.3% of the mix.

CONCLUSIONS:

1. The method used to determine the biphenyl in the bags is only accurate to 25 per cent.
2. Based on the analyses, the bags are not uniformly impregnated.
3. Some biphenyl has migrated to the outside layers of the bags.
4. The biphenyl in the oil mixture is approximately $17.3 \pm 0.5\%$

RECOMMENDATIONS:

A more accurate micro method of analyzing for biphenyl is desirable in case more work of this nature is anticipated.

AB
4/11/46

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PREVIOUS WORK:

"The Absorption of Diphenyl by Oranges from Treated Wraps." R. G. Tomkins and F. A. Isherwood. Analyst, 1945, 70, 330.

EXPERIMENTAL DATA:

The analytical data are rounded off to show that the method used is only a close estimate. The locality of the samples indicates that the squares were cut either above or below the middle of the bag and check analyses were taken from the opposite side of the bag. All three layers were analyzed at each locality.

An area of 25 square inches was taken for each analysis. This weighed piece was extracted with 25 cc of distilled chloroform for 12 hours in tightly covered bottles. The test was performed by using the color reaction obtained when $AlCl_3$ is reacted with the biphenyl and chloroform mixture. Color intensity was compared to known standards and the total biphenyl present was calculated.

Biphenyl Analyses of Bags - 25-Square-Inch Samples

Bag No. 1	Weight of Paper, gms.	Total Mg. Biphenyl Found	% Biphenyl	Mg. Biphenyl Per Sq. Inch
I-T	1.7085	30	1.8	1.2
	1.6605	20	1.2	.8
M-T	1.4198	3.5	.3	.14
	1.5005	3	.2	.12
O-T	1.4401	3	.2	.12
	1.5656	1.5	.1	.06
I-B	1.6610	15	.9	.6
	1.6037	17.5	1.1	.7
M-B	1.4930	7.5	.5	.3
	1.4365	3	.2	.12
O-B	1.4660	4	.3	.16
	1.4445	2	.1	.08

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Bag No. 2	Weight of Paper, gms.	Total Mg. Biphenyl Found	% Biphenyl	Mg. Biphenyl Per Sq. Inch
I-T	1.6390	20	1.2	.8
	1.6165	15	.9	.6
M-T	1.4280	5	.4	.2
	1.4330	5	.4	.2
O-T	1.4680	4	.3	.16
	1.3910	4	.3	.16
I-B	1.6310	10	.6	.4
	1.5930	10	.6	.4
M-B	1.4110	4.5	.3	.18
	1.4570	4	.3	.16
O-B	1.3615	3.5	.2	.14
	1.4340	3	.2	.12

Note: I - Inner Layer
M - Middle Layer
O - Outer Layer
T - Top of Bag
B - Bottom of Bag

Check analyses are from opposite side of bag.

The oil mixture containing biphenyl was fractionated in two distillations. The boiling point difference between biphenyl and mineral oil allowed a very distinct break in the sample cut.

The first run showed 16.5 per cent biphenyl while the second run showed 18.7 per cent. An average of the two runs was 17.3%. The difference in the two runs is no doubt due to some hold up in the column after the first distillations.

NOTEBOOK REFERENCES:

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