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of a Material Used as a Coating on Incandescent Light Bulbs and
Containing Barium Lead Carbonate

Introduction

The experiment described herein was designed to furnish information to the Lamp Division of the General Electric Company, concerning the likelihood of the absorption of lead from a lead-containing plastic coating used on the surface of incandescent lamps, should the coating be ingested accidentally or purposefully by a child or other person.

The plastic coating was furnished by the producer as thin strips of the material which had been removed from finished lamps. The coating from each lamp was processed in a separate vial, and the average weight of each sample so obtained was approximately 0.25 grams. The plastic material was characterized as a white, waxy material, but rather sticky when, undissolved in radio lead carbonate (PbCO₃ - PbO) in suspension. The lead content of

at the campsite, after which time the witnesses to the robbery were
by, the central of the building the group and the two men were
was covered. During this entire period, the subject of load in the house
and books were being observed, as known. They had been in the entire
proceedings period during which the subject had been under investigation.

From the twenty-ninth through the thirty-first day, the subject
counting of the large was indicated by the subject in the house O.D. from
per day, after which the subject returned to the central of the two the
thirty-fourth through the thirty-sixth day. The observations of the
load in the water and books were continued. The analytical results of the
food, rocks and water, covering the entire period represented above, and

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elaborate experiment. (It was anticipated that the participation of this subject in this brief experiment would not adequately him, in any manner, for the longer and more elaborate experiment in which he is to engage a little later.) This subject carried on the activities of ordinary life in a routine manner, and was not exposed to any unusual source of lead in his home or working environment.

The schedule of this experiment included nine days of preliminary (control) observations, during the first five days of which he adopted his customary routine to the extent of including his specific kind and quantity of soup in which the plastic material was to be suspended. After the preliminary period of nine days, a second (control) period of five days followed, during which time his diet included the same soup containing 0.25 grams of a lead-free plastic paper which simulated an appearance and

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in the plastic lead not been ingested. The average quantity of lead excreted in the urine, during the same three-day period, was 0.018 milligrams, which was essentially the same as, actually slightly lower than, the average quantity excreted daily during the control period.

During the second period in which the plastic coating was being fed, the subject ingested 30 milligrams of lead per day in that manner (in addition to that contained in the food itself) on each of five days. The feces evacuated during the thirty-three days through the thirty-three day contained 100.34 milligrams of lead in excess of that which would have been expected had the 150 milligrams of lead in the plastic not been ingested. (The discrepancy here, that is, the apparent excess of output over intake, may

continuing through forty-one days, have been assembled in a form convenient for examination, in three tables.

Experimental Results

The results referred to above, with the exception of those obtained by the analysis of blood, are set forth in Table 1. It may be seen that the quantities of food in the feed, feces and urine, during the first nine days of this period, were essentially the same as those in the subsequent five days. The initial period of fourteen days may, therefore, be taken together to be the control period. The relationships of the rations, in terms of the degree of balance between the intake and output of food during this control period, are shown in Table 2.

With the first feeding of alfalfa on the fifteenth day, the subject ingested an additional amount of food in the plastic. The output of food in the

be ascribed to small sampling errors (plastic or food or both) which are almost inevitable in an experiment of relatively short duration. The point of importance is that apparently all of the lead ingested in this form is accounted for in the fecal excretions. The conclusion might be drawn that no lead was absorbed from the plastic during this period. This is not necessarily true, but certainly the quantity absorbed was small.

The data obtained by the analysis of the urine represent the crucial evidence with reference to the absorption of lead. It may be noted that the urinary output of lead during the pertinent

significance. It is a matter of importance that it increased progressively from the thirtieth to the thirty-third day, when the peak value of 0.033 milligrams was reached, after which it fell off and could not be differentiated from the earlier results after the fortieth day.

The data as to the concentration of lead in the blood of the subject, before, during, and after the experimental regimen, are given in Table 3. The concentration in the blood was unaffected by the feeding of the plastic.

Table 1

The Intake and Output of Lead Before, During, and After the Experimental Ingestion of a Plastic Containing Lead

Day	Schedule of administration of plastic	Lead in food mg. per 24 hrs.	Output of lead mg. per 24 hrs. in urine. in feces.
1	Control	0.96	0.017
2	"	0.30	0.013
3	"	0.01	0.013
4	"	0.29	0.020
5	"	0.13	0.013
6	"	0.30	0.023
7	"	0.12	0.017
8	"	0.21	0.010
9	"	0.03	0.014
10	"	0.21	0.017
11	"	0.15	0.021
12	"	0.00	0.021
13	"	0.27	0.013
14	"	0.30	0.014
15	250 mg. of plastic	0.24	0.017

	<u>Lead ingested</u>	<u>Lead</u>
	In food (mg.)	In urine (mg.)
Summation of results obtain- ed during 14 days	3.23	.33
Daily average of results obtained during 14 days	.23	.02
N.D.	.189	.005

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Day of Experiment

1

8

13

18

24

30

37

43

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Comment

The results obtained in this experiment confirm completely the expectations based on prior experience and experimentation. The absorption of the inorganic compounds of lead, from the alimentary tract, even at best, when soluble compounds in aqueous solution are ingested, occurs to only a modest extent. In this instance, it could be expected confidently that the basic lead carbonate, mixed in an essentially inert plastic material, would not be accessible for absorption to any considerable extent. It was in no sense surprising, therefore, that the alimentary

the period in which there was a large quantity of lead in the alimentary tract over the period of several days, as indicated by a very slight increase in the rate of the excretion of lead in the urine. This increase was so minute, however, that it could be considered to be significant only in statistical terms. The lead excreted in the urine during the relevant period never exceeded quantities that are often found in the urine of ordinary, normal persons, and the slight elevation above the previous (control) level would have had no significance even statistically but for the fact that it appeared at the right time, persisted for several days, and then disappeared just when it could most reasonably be expected to do so. As we have observed previously when a person (or persons) has been subjected to a very slight and hygienically insignificant degree of exposure to lead, there was no change in the level of lead concentration

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continued within it is accepted elsewhere only to an extremely negligible
extent.

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in the blood. The occurrence of the slight elevation of the urinary concentration of lead is coincident with the experimental ingestion of the lead-containing plastic may have been a matter of chance, but it is reasonable, at least, to attribute it to the presence of the experimental material within the alimentary tract. In any case, the evidence is adequate to demonstrate the complete insignificance of the potential hazard under investigation from the aspect of any hazardous degree of absorption of lead.

Conclusion

This experiment has demonstrated conclusively that the accidental or intentional ingestion of the lead-containing plastic