

REVISED

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E. I. du Pont de Nemours and Company
Haskell Laboratory for Toxicology and Industrial Medicine
Elkton Road, Newark, Delaware 19711

HASKELL LABORATORY REPORT NO. 373-80

MR NO. 3540-001

<u>Material Tested</u>	<u>Haskell No.</u>	<u>Other Codes</u>
1) Paint, Dulux Enamel*	13,257	#93-21667
2) Lead Naphthanate*	13,163	H-624

Study Initiated/Completed
2/4/80-3/14/80

Material Submitted by
E. E. Swain, Jr.
Fabrics & Finishes Dept.
Wilmington

ACUTE SKIN ABSORPTION TEST ON RABBITS

Procedure: Three groups of male albino rabbits, 10 per group with average body weights approximately the same, were clipped free of hair over the back and trunk area and fitted with plastic collars. Group I, controls, received 1.0 ml of distilled water. Group II, test rabbits, was treated with 1.0 ml of a suspension containing paint, Dulux enamel and 1.2%^a lead naphthanate. Group III, test rabbits, was treated with 1.0 ml of a suspension containing paint, Dulux enamel and 6.0%^a lead naphthanate. One and a half inch square plastic pads were used to contain the material. The trunk of each animal was then wrapped with a layer of Saran® Wrap, Kling® gauze bandage and Elastoplast® adhesive bandage. After a 6-hour exposure period, the wrappings were removed. All animals received treatments once a day for 10 consecutive days. All rabbits were held for 29 days after the last treatment for blood evaluations.

Blood lead levels for the test rabbits were analyzed before treatment and on days 5, 10 (last treatment day), 15 and 39 of the study. The control rabbits were examined before treatment and on days 15 and 39 of the study. Blood levels were analyzed by flame atomic absorption spectroscopy.†

^a = Lead naphthanate added to base paint containing 0.415% lead naphthanate to equal % indicated.

Results: A few blood lead values appear to be inconsistent with the other determined values, but are listed for completeness. In summarizing the data, these values are considered to be outliers.

Group I - Controls - Distilled Water

Rabbit No.	Body Weight		Blood Lead Level (µg/l)		
	Initial	Final	Initial	Day 15	Day 29
	Wt. (gm) Day 0	Wt. (gm) Day 29			
15030	2562	3215	ND	ND	ND
15031	2409	2955	ND	ND	124
15032	2380	2900	ND	ND	ND
15033	2367	3028	ND	ND	ND
15034	2563	2850	ND	ND	ND
15035	2170	2805	ND	ND	ND
15036	1853	2587	ND	ND	ND
15037	2400	2628	ND	ND	ND
15038	2535	3007	ND	ND	ND
15039	2283	3054	ND	ND	ND

$\bar{x}=2352.2$ $\bar{x}=2902.9$

Group II - Paint, Dulux Enamel with 1.2% Lead Naphthanate

Rabbit No.	Body Weight		Blood Lead Level (µg/l)					
	Initial	Final	Treatment Days			Post-Treatment Days		
	Wt. (gm) Day 0	Wt. (gm) Day 29	Initial	Day 5	Day 10	Day 15	Day 29	Day 39
15010	2310	3375	ND	253	175	311	54	132
15011	1963	2772	28.5	154	163	179	117	60
15012	2325	3245	31.5	384	158	199	157	76
15013	1941	3530	ND	215	252	317	138	90
15014	2170	2735	ND	435	337	255	191	134
15015	2212	3182	ND	436	204	344	100	76
15016	1882	3085	ND	105	358	297	100	32
15017	2367	2910	ND	519	206	300	223	84
15018	2422	3012	ND	365	ND	222	241	69
15019	2427	2535	ND	404	ND	208	97	68
$\bar{x}=2392.8$ $\bar{x}=3038.1$			$\bar{x}=327.8$	232.0	263.9	142.0	82.0	
			± 136.8	± 77.7	± 57	± 60	± 31	

Group III - Paint, Dulux Enamel with 6% Lead Naphthanate

Rabbit No.	Body Weight		Blood Lead Level (µg/l)					
	Initial	Final	Treatment Days			Post-Treatment Days		
	Wt. (gm)	Wt. (gm)	Initial	Day 5	Day 10	Day 15	Day 29	Day 39
	Day 0	Day 29						
15020	2287	3058	ND	348	122	266	281	119
15021	1898	2741	ND	490	252	455	306	169
15022	2173	2955	ND	104	ND	631	220	120
15023	2151	3008	ND	88*	ND	491	268	161
15024	2444	2625	ND	363	288	502	304	113
15025	2647	2938	ND	481	636	493	270	87
15026	2266	2900	ND	342	303	365	218	80
15027	2052	2411	ND	307	393	392	364	ND
15028	2441	2390	ND	479	350	167	254	150
15029	2250	2730	ND	639	471	1156	284	137
	$\bar{x}=2362$	$\bar{x}=2876$		$\bar{x}=364.9$	$\bar{x}=352.0$	$\bar{x}=491.8$	$\bar{x}=277.0$	$\bar{x}=114.0$
				$+172.0$	$+153.9$	$+267.6$	$+43$	$+49$

ND = None detected (Minimum detectable limit = 25 µg/l).

* = Sample spilled, no correction.

Clinical Signs: Weight loss was sporadic in both tests groups and the controls. Rabbit 15026, Group III, had moderate-severe eye discharge from the right eye and severe discharge from the left eye on the 14th day of the study.

Throughout the study, there was a problem of the paint adhering to the skin and to the plastic pads used to contain the paint. Because of this, glass watch covers were substituted for the plastic pads on the 4th day of treatment. Rabbits 15013 and 15025 had sores and cracks on their skin due to the paint by the 5th day of treatment. By the 7th day of treatment, there was generally some cracking of the skin throughout both test groups, II and III.

It can be seen that the lead was absorbed from the skin by comparing values from day 0 to day 5 in both groups. Blood lead values appeared to reach a peak by day 5 and leveled off by day 10 in Group II. These values did not change very much by day 15. However, by day 29 lead values had dropped from a mean of 263.9 to 142.0 µg/l at day 15. This value decreased to 82 µg/l at day 39.

Group III blood lead values appeared to reach a peak by day 5, though the pattern was not as definite as with Group II. The blood lead values appeared to level off by day 10; and as in Group II, the values had not changed very much by day 15. Again, there was a drop in lead values from a mean of 491.8 µg/l at day 15 to a mean of 277 µg/l at day 29. This value decreased to 114 µg/l with an additional 10 day period (Day 39).

Summary: Paint Dulux Enamel containing 1.2% and 6% lead naphthanate was applied under occlusion for 10 consecutive days to the skin of 2 groups of 10 rabbits, respectively, for 6 hours per day to determine the amount of lead absorbed during and up to 29 days after exposure. When paint, Dulux Enamel containing 1.2% and 6% lead naphthanate was administered topically to rabbits lead from the paint was absorbed and detected in blood. By comparing the blood lead values for the 1.2% and 6% groups throughout the study, a dose response relationship can be observed where the absorption is greater in the 6% group by approximately a 1.5 fold increase, expressing less than a linear absorption pattern. This study also demonstrates that these values peak and once exposure is terminated, they level off and with time decrease.

* Composition:

<u>Paint, Dulux Enamel (H-13,257)</u>	
Titanium dioxide	15.7%
Pigments	0.16
Soya lecithin	0.19
Alkyd Resins	31.77
Butylated melamine-formaldehyde	0.34
Guaicol C	0.03
Linseed Oil	0.02
6% Cobalt Naphthanate	0.20
24% Lead Naphthanate	0.415
6% Manganese Naphthanate	0.034
Toluene	0.27
Butyl alcohol	0.27
Naphtha	11.41
Mineral Spirits	10.3
Hydrocarbon Solution	8.05
Xylene	2.76
Arom. Hydrocarbon 150-190°C	12.5
Arom. Hydrocarbon 182-219°C	5.3
<u>Lead Naphthanate (H-13,163)</u>	24%

† Blood lead analyses were conducted by D. J. Kasprzak, Research Chemist, Haskell Laboratory (HLR No. 241-80).

Graphs of blood lead values for each individual rabbit in the test groups are attached.

Report by:

Polly Ashley
Polly Ashley
Biochemist

Approved by:

Gerald L. Kennedy
Gerald L. Kennedy
Chief, Acute Investigations Section

PA:vlm

Study Director: O. L. Dashiell

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